

EXHIBIT F

Curriculum Vitae

for

Frank J. Coale
Professor & Department Chair

Department of Environmental Science and Technology
College of Agriculture and Natural Resources
University of Maryland
College Park, Maryland 20742

January 1, 2008

Notarization: I have read the following and certify that this Curriculum Vitae is a current and accurate statement of my professional record.

Signature: _____
Frank J. Coale

Date: _____
January 1, 2008

Frank J. Coale

1. PERSONAL INFORMATION

FRANK J. COALE
Professor & Department Chair

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EDUCATION

Ph.D. Soil Fertility, Department of Agronomy, University of Kentucky, December 1986.
M.S. Crop Physiology, Department of Agronomy, University of Kentucky, August 1983.
B.S. Agronomy-Crop Science, Department of Agronomy, University of Maryland, May 1981.

EMPLOYMENT

Department Chair (July 2006 – present), Department of Environmental Science and Technology, University of Maryland, College Park, MD. Inaugural Chair of a newly formed department. Responsible for constructing new departmental structure, administration, curriculum, recruitment of faculty and students, and development activities.

Department Chair (May 2005 – June 2006), Department of Natural Resource Sciences and Landscape Architecture, University of Maryland, College Park, MD. Administrative responsibility for management of teaching, research, and Extension programs in a discipline-diverse academic department of 40+ faculty.

Professor of Soil Science (July 2002 – present) and Associate Professor of Soil Science (July 1993 – June 2002), Soil Fertility and Nutrient Management Specialist, University of Maryland, College Park, MD. Extension/research (80%/20%) appointment with statewide responsibilities for soil fertility and efficient nutrient management for agronomic crop production and environmental protection.

Associate Professor of Agronomy (July 1991 – July 1993) and Assistant Professor of Agronomy (September 1986 – June 1991), Extension Agronomist, University of Florida, Everglades Research and Education Center, Belle Glade, FL. Extension/research (70%/30%) appointment with responsibilities including sugarcane and rice production on organic and mineral soils.

Graduate Research Assistant (Ph.D.), Soil Fertility, Dep. of Agronomy, Univ. of Kentucky, Lexington, KY.
Dissertation title: "Potassium Utilization and Root and Shoot Development of No-Till Full-Season and Double-Crop Soybean." August 1983 to September 1986.

Graduate Teaching Assistant, Soil Fertility, Department of Agronomy, Univ. of Kentucky, Lexington, KY.
January 1985 to May 1985.

Graduate Research Assistant (M.S.), Crop Physiology, Dep. of Agronomy, Univ. of Kentucky, Lexington, KY.
Thesis title: "Effect of N, Na, and K Fertilization on Mineral Composition, Potential Incidence of Grass Tetany and Yield of Tall Fescue." September 1981 to August 1983.

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2. RESEARCH, SCHOLARLY, AND CREATIVE ACTIVITIES

a. Books

i. Books edited

Coale, F.J. (ed). 1997. Chesapeake Bay region nutrient management training manual. US Environmental Protection Agency Chesapeake Bay Program, Annapolis, MD.

IMPACT: First of its kind and state of the art comprehensive agricultural nutrient management training manual. This training manual is used extensively in professional training throughout the eastern United States (MD, PA, DE, VA, NC, GA, WV, VT).

ii. Chapters in books

IMPACT: Provided instruction and research resource materials on soil phosphorus dynamics and agricultural nutrient management for agricultural managers, researchers, and natural resource management professionals

(authors listed in order of intellectual contribution, senior author listed first)

1. Coale, F.J. 1994. Sugarcane production in the EAA. p.224-237. In A.B. Bottcher and F.T. Izuno (ed.) Everglades Agricultural Area (EAA) Water, Soil, Crop and Environmental Management. University Press of Florida, Gainesville, FL.
2. Coale, F.J. 2000. Phosphorus dynamics in soils of the Chesapeake Bay watershed: A primer. p.43-55. In A.N. Sharpley (ed.) Agriculture and Phosphorus Management: The Chesapeake Bay. Lewis Publishers, CRC Press, Boca Raton, FL.
3. Coale, F.J. 2000. Sample collection, handling, preparation and storage. p.10-12. In G.M. Pierzynski (ed.) Methods of Phosphorus Analysis of Soils, Sediments, Residuals, and Waters. Southern Cooperative Series Bulletin No. 396.
4. Moore, P. and F. Coale. 2000. Phosphate fractionation in flooded soils and sediments. p.59-63. In G.M. Pierzynski (ed.) Methods of Phosphorus Analysis of Soils, Sediments, Residuals, and Waters. Southern Cooperative Series Bulletin No. 396.
5. Sims, J. T. and F. J. Coale. 2002. Solutions to nutrient management problems in the Chesapeake Bay Watershed, USA. p. 345-371 In P. M. Haygarth and S. C. Jarvis (ed.) Agriculture, Hydrology, and Water Quality. CABI Publishing, Wallingford, UK.
6. Coale, F. J., J. T. Sims, A. B. Leytem, and E. Baugher. 2002. Accelerated deployment of an agricultural nutrient management tool in response to local government policy: The Maryland Phosphorus Site Index. p. 101-105 In J. Steenvoorden, F. Claessen and J. Willems (ed). Agricultural Effects on Ground and Surface Waters: Research at the Edge of Science and Society. Intern. Assoc. Hydrological Sci., IAHS Pub. No. 273., Wallingford, UK.

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b. Articles in Refereed Journals

IMPACT: I have maintained a consistent, career-long research focus on agricultural production efficiency, sustainability of agricultural production systems, and environmental protection. The direction of my research has been determined by critical needs identified through Extension program development and my Extension programs have been built upon rigorous applied research.

(authors listed in order of intellectual contribution, senior author listed first, * denotes graduate student or post-doc)

1. Coale, F.J., V.P. Evangelou, and J.H. Grove. 1984. Effects of saline-sodic soil chemistry on soybean mineral composition and stomatal resistance. *J. Environ. Qual.* 13:635-639.
2. Coale, F.J., J.J. Meisinger, and W.J. Wiebold. 1985. Effects of plant breeding and selection on yields and nitrogen fixation in soybeans under two soil nitrogen regimes. *Plant Soil* 86:357-367.
3. Coale, F.J., and J.H. Grove. 1986. Alterations in soybean root development due to cultural practices: A review. *Commun. Soil Sci. Plant Anal.* 17:799-818.
4. Coale, F.J., and J.H. Grove. 1986. Effect of soil potassium availability on soybean root and shoot growth under unrestrained rooting conditions. *J. Plant Nutr.* 9:1565-1584.
5. Evangelou, V.P., and F.J. Coale. 1987. Dependence of the Gapon coefficient on exchangeable sodium for mineralogically different soils. *Soil Sci. Soc. Am. J.* 51:68-72.
6. Evangelou, V.P., and F.J. Coale. 1988. An investigation on the dependence of the Gapon coefficient on exchangeable sodium by three linear transformations. *Can. J. Soil Sci.* 68:813-820.
7. Coale, F.J., and R.H. Cherry. 1989. Impact of white grub (*Ligyris subtropicus* (Blatchley)) infestation on sugarcane nutrition. *J. Plant Nutr.* 12:1351-1359.
8. Coale, F.J., and R.H. Cherry. 1989. Effect of white grub (*Ligyris subtropicus* (Blatchley)) infestations on sugarcane root:shoot relationships. *J. Am. Soc. Sugar Cane Technol.* 9:52-55.
9. Snyder, G.H., D.B. Jones, and F.J. Coale. 1990. Occurrence and correction of manganese deficiency in Histosol-grown rice. *Soil Sci. Soc. Am. J.* 54:1634-1638.
10. Coale, F.J., and C.A. Sanchez. 1990. Effective distance of nutrient acquisition for sugarcane grown on Everglades Histosols. *J. Am. Soc. Sugar Cane Technol.* 10:39-44.
11. Coale, F.J., and J.H. Grove. 1990. Root distribution and shoot development in no-till full-season and double-crop soybean. *Agron. J.* 82:606-612.
12. Cherry, R.H., F.J. Coale, and P.S. Porter. 1990. Oviposition of sugarcane grubs (Coleoptera:Scarabaeidae) at different soil moistures. *J. Econ. Entomol.* 83:1355-1359.
13. Izuno, F.T., C.A. Sanchez, F.J. Coale, A.B. Bottcher, and D.B. Jones. 1991. Phosphorus concentrations in drainage water in the Everglades Agricultural Area. *J. Environ. Qual.* 20:608-619.
14. Coale, F.J., and M.F. Ulloa. 1991. Post-freeze deterioration of sugarcane cultivars in Florida. *J. Am. Soc. Sugar Cane Technol.* 11: 82-87.
15. Coale, F.J., and O. Sosa, Jr. 1991. Sugarcane yield response to soil insecticides in the Everglades Agricultural Area. *J. Am. Soc. Sugar Cane Technol.* 11:23-28.
16. Coale, F.J., and J.H. Grove. 1991. Potassium utilization of no-till full-season and double-crop soybean. *Agron. J.* 83:190-194.
17. Nagata, R.T., C.A. Sanchez, and F.J. Coale. 1992. Crisphead lettuce cultivar response to fertilizer phosphorus. *J. Amer. Soc. Hort. Sci.* 117:721-724.
18. Coale, F.J., and T.J. Schueneman. 1993. Sugarcane response to limestone and gypsum application on acidic sandy soils. *J. Am. Soc. Sugar Cane Technol.* 13:73-86.
19. Coale, F.J., C.A. Sanchez, F.T. Izuno, and A.B. Bottcher. 1993. Nutrient accumulation and removal by sugarcane grown on Everglades Histosols. *Agron. J.* 85:310-315.
20. Coale, F.J. 1993. Sugarcane cultivar response to dolomite amendment of an acidic sandy soil. *J. Am. Soc. Sugar Cane Technol.* 13:87-94.
21. Coale, F.J., P.S. Porter, and W. Davis. 1994. Soil amendments for reducing phosphorus concentration of drainage water from Histosols. *Soil Sci. Soc. Am. J.* 58:1470-1475.

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22. Coale, F.J., and D.B. Jones. 1994. Reflood timing for ratoon rice grown on Everglades Histosols. *Agron. J.* 86:478-482.
23. Coale, F.J., F.T. Izuno, and A.B. Bottcher. 1994. Sugarcane production impact on nitrogen and phosphorus in drainage water from Everglades Histosols. *J. Environ. Qual.* 23:116-120.
24. Coale, F.J., F.T. Izuno, and A.B. Bottcher. 1994. Phosphorus in drainage water from sugarcane in the Everglades. Agricultural Area as affected by drainage rate. *J. Environ. Qual.* 23:121-126.
25. Cherry, R.H., and F.J. Coale. 1994. Oviposition of the sugarcane grub, *Ligyris subtrropicus*, (Coleoptera:Scarabaeidae) in different soils. *J. Agric. Entom.* 11:345-348.
26. Izuno, F.T., A.B. Bottcher, F.J. Coale, C.A. Sanchez, and D.B. Jones. 1995. Agricultural BMPs for phosphorus reduction in south Florida. *Trans. ASAE.* 38:735-744.
27. Capone, L.T., F.T. Izuno, A.B. Bottcher, C.A. Sanchez, F.J. Coale, and D.B. Jones. 1995. Nitrogen concentrations in agricultural drainage water in south Florida. *Trans. ASAE.* 38: 1089-1098.
28. * Eriksen, G.N., F. J. Coale, and G.A. Bollero. 1999. Soil nitrogen dynamics and maize production in municipal solid waste compost amended soil. *Agron. J.* 91:1009-1016.
29. Maguire, R.O., J.T. Sims, and F.J. Coale. 2000. Phosphorus solubility in biosolids-amended farm soils in the mid-Atlantic region of the USA. *J. Environ. Qual.* 29: 1225-1233.
30. Delorme, T.A., J.S. Angle, F.J. Coale, and R.L. Chaney. 2000. Phytoremediation of phosphorus enriched soils. *International J. Phytoremediation* 2:173-181.
31. Costa, J.M., G.A. Bollero, and F.J. Coale. 2000. Early season nitrogen accumulation in winter wheat. *J. Plant Nutrition* 23:773-783.
32. Coale, F.J., J.M. Costa, G.A. Bollero, and S.P. Schlosnagle. 2001. Small grain winter cover crops for conservation of residual soil nitrogen in the mid-Atlantic Coastal Plain. *Am. J. Alternative Agric.* 16:66-72.
33. Maguire, R. O., J. T. Sims, S. K. Dentel, F. J. Coale, and J. T. Mah. 2001. Relationship between biosolids treatment process and soil phosphorus availability. *J. Environ. Qual.* 30:1023-1033.
34. Maguire, R. O., J. T. Sims, and F. J. Coale. 2001. Phosphorus fractionation in biosolids-amended soils: relationship soluble and desorbable phosphorus. *Soil Sci. Soc. Am. J.* 64:2018-2024.
35. Coale, F. J. , J. T. Sims, and A. B. Leytem. 2002. Accelerated deployment of an agricultural nutrient management tool: the Maryland Phosphorus Site Index. *J. Environ. Qual.* 31:1471-1476.
36. Cooperband, L., G. Bollero, and F. Coale. 2002. Effect of poultry litter and composts on soil nitrogen and phosphorus availability and corn production. *Nutrient Cycling in Agroecosystems* 62:185-194.
37. Heckman, J. R., J. T. Sims, D. B. Beegle, F. J. Coale, S. J. Herbert, T. W. Bruulsema, and W. J. Bamka. 2003. Nutrient removal by corn grain harvest. *Agron. J.* 95:587-591.
38. Leytem, A. B., J. T. Sims, and F. J. Coale. 2003. On-farm evaluation of a phosphorus site index for Delaware. *J. Soil Water Conserv.* 58:89-97.
39. Leytem, A. B., J. T. Sims, and F. J. Coale. 2004. Determination of phosphorus source coefficients for organic phosphorus sources: laboratory studies. *J. Environ. Qual.* 33: 380-388.
40. Webster, A. M., C. L. Mulchi, D. Conrad, P. Steinhilber, and F. J. Coale. 2005. Comparing broiler litter vs. sodium nitrate as N sources for Maryland tobacco production. *Tobacco Sci.*: (in press).
41. Webster, A. M., C. L. Mulchi, D. Conrad, P. Steinhilber, and F. J. Coale. 2005. Presidedress nitrate test (PSNT) to assess N availability in broiler litter amended soils for Maryland tobacco production. *Tobacco Sci.*: (in press).
42. * Butler, J. S. and F. J. Coale. 2005. Phosphorus leaching in manure amended Atlantic Coastal Plain soils. *J. Environ. Qual.* 34: 370-381.
43. Kratochvil, R. J., F. J. Coale, B. Momen, M. R. Harrison Jr., J. T. Pearce, and S. Schlosnagle. 2006. Cropping systems for phytoremediation of phosphorus-enriched soils. *International J. Phytoremediation* 8: 117-130.
44. Heckman, J. R., W. Jokela, T. Morris, D. B. Beegle, T. Sims, F. J. Coale, S. Herbert, T. Griffin, B. Hoskins, J. Jemison, W. M. Sullivan, D. Bhumbra, G. Estes, and W. S. Reid. 2006. Soil test calibration for predicting corn response to phosphorus in the northeast USA. *Agronomy J.* 98: (in press).
45. * White, J. W., F. J. Coale, and J. T. Sims. 2006. Phosphorus fate in runoff from biosolids amended soil. *J. Environ. Qual.* 35: (in review).
46. * White, J. W., J. T. Sims, J. T., and F. J. Coale. 2006. Phosphorus fate in soil amended with biosolids. *J.*

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Environ. Qual. 35: (in review).

47. Smith, M., J. White, and F.J. Coale. 2007. Evaluation of phosphorus source coefficients as predictors of runoff phosphorus concentrations. J. Environ. Qual. 36: (in review).
48. * Bilek, M., F.J. Coale, and R.L. Hill. 2007. Winter annual rye cover crops in no-till grain crop rotations: impacts on soil physical properties. Agron. J. (in review).

c. Monographs, Reports, and Extension Publications

(authors listed in order of intellectual contribution, senior author listed first, * denotes graduate student or post-doc)

Extension Publications (University of Florida, 1986 – 1993)

Extension Newsletters

IMPACT: Between 1986 and 1992, I edited and produced 46 Extension Education Newsletters that filled a critical educational void by providing research-based production information packaged directly for the Florida sugarcane and rice farmers.

Coale, F.J. (ed) Sugarcane Growers Newsletter. Florida Cooperative Extension Service.

- 1987, Volume 1, Numbers 1 – 6
- 1988, Volume 2, Numbers 1 – 6
- 1989, Volume 3, Numbers 1 – 6
- 1990, Volume 4, Numbers 1 – 6
- 1991, Volume 5, Numbers 1 – 6

Coale, F.J. and D.B. Jones (ed). Everglades Rice Newsletter. Florida Cooperative Extension Service.

- 1988, Volume 1, Numbers 1 – 4
- 1989, Volume 2, Numbers 1 – 4
- 1990, Volume 3, Numbers 1 – 4
- 1991, Volume 4, Numbers 1 – 4

Extension Fact Sheets and Research Reports (University of Florida, 1986 – 1993)

IMPACT: Provided time-critical production related information to the Florida sugarcane and rice growing communities which had few alternative information resources.

(authors listed in order of intellectual contribution, senior author listed first, * denotes graduate student or post-doc)

1. Coale, F.J. (ed.). 1987. Tenth annual rice field day. Belle Glade EREC Research Report EV-1988-2. Florida Agric. Exp. Stn.
2. Coale, F.J. 1987. A traveler's guide to Florida sugarcane. Agronomy Facts No. 216. Florida Coop. Ext. Serv.
3. Coale, F.J. 1987. 1986/87 sugarcane variety trials. Agronomy Facts No. 214. Florida Coop. Ext. Serv.
4. Coale, F.J. 1987. DD₅₀ rice management program: theory and use. p. 13-17. In F.J. Coale (ed.) Tenth annual rice field day. Belle Glade EREC Research Report EV-1987-2. Florida Agric. Exp. Stn.
5. Coale, F.J. 1987. 1986 Florida sugarcane variety census. Agronomy Facts No. 206. Florida Coop. Ext. Serv.
6. Coale, F.J., J.A. Dusky, and D.L. Colvin. 1987. Weed control in sugarcane-1987. Weeds in the sunshine, A-87-14. Florida Coop. Ext. Serv.
7. Glaz, B., and F.J. Coale. 1987. Florida's 1987 sugarcane variety census. Sugar y Azucar 82(12):19-23.
8. Whitty, E.B., C.G. Chambliss, C.K. Hiebsch, D.L. Wright, F.J. Coale, and R.J. Stephenson. 1987. 1987 field and forage crop variety recommendations. Agronomy Facts No. 207. Florida Coop. Ext. Serv.
9. Coale, F.J. (ed.). 1988. Eleventh annual rice field day. Belle Glade EREC Research Report EV-1988-2. Florida

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10. Coale, F.J., J.A. Dusky, and D.L. Colvin. 1988. Weed control in sugarcane - 1988. Weeds in the sunshine, WIS-88-9. Florida Coop. Ext. Serv. AGR-9. Florida Coop. Ext. Serv.
11. Coale, F.J. 1988. Florida's 1987 sugarcane variety census. Agronomy Facts No. 231. Florida Coop. Ext. Serv.
12. Coale, F.J. 1988. Sugarcane. Chapter 5. In F.T. Izuno and A.B. Botcher (ed.) Components of the EAA agricultural system that relate to water quality in south Florida. Final report: The effects of on-farm agricultural practices in the organic soils of the EAA on nitrogen and phosphorus transport, part II. South Florida Water Management District, West Palm Beach, FL.
13. Coale, F.J. 1988. 1987/88 sugarcane variety trials. Agronomy Facts No. 229. Florida Coop. Ext. Serv.
14. Coale, F.J., and B. Glaz. 1988. Florida's 1988 sugar cane variety census. Sugar y Azucar 83(12):27-34.
15. Coale, F.J., and D.B. Jones. 1988. Rice varieties for Florida. Agronomy Facts No. 230. Florida Coop. Ext. Serv.
16. Whitty, E.B., C.G. Chambliss, C.K. Hiebsch, D.L. Wright, F.J. Coale, and R.J. Stephenson. 1988. 1988 field and forage crop variety recommendations. Agronomy Facts No. 220. Florida Coop. Ext. Serv.
17. Coale, F.J. (ed.). 1989. Twelfth annual rice field day. Belle Glade EREC Research Report EV-1989-5. Florida Agric. Exp. Stn.
18. Coale, F.J. (ed.). 1989. 1989 sugarcane growers seminar. Belle Glade EREC Research Report EV-1989-3. Florida Agric. Exp. Stn. 43 pp.
19. Coale, F.J. (ed.). 1989. 1989 rice growers seminar. Belle Glade EREC Research Report EV-1989-1. Florida Agric. Exp. Stn. 54 pp.
20. Coale, F.J., J.A. Dusky, and D.L. Colvin. 1989. Weed control in sugarcane - 1989. Weeds in the sunshine, SS-AGR-909. Florida Coop. Ext. Serv.
21. Coale, F.J., and D.B. Jones. 1989. DD₅₀ rice management program database development for the Everglades Agricultural Area. p. 51-53. In F.J. Coale (ed.) 1989 rice growers seminar. Belle Glade EREC Research Report EV-1989-1. Florida Agric. Exp. Stn.
22. Coale, F.J., and D.B. Jones. 1989. Ratoon reflooding study. In F.J. Coale (ed.) Twelfth annual rice field day. Belle Glade EREC Research Report EV-1989-5. Florida Agric. Exp. Stn.
23. Coale, F.J., D.B. Jones, J.A. Dusky, and D.L. Colvin. 1989. Weed control in rice - 1989. Weeds In The Sunshine SS-AGR- 910. Florida Coop. Ext. Serv.
24. Coale, F.J., and M.F. Ulloa. 1989. 1988-89 Sugarcane variety trials. p. 7-12. In F.J. Coale (ed.) 1989 sugarcane growers seminar. Belle Glade EREC Research Report EV-1989-3. Florida Agric. Exp. Stn.
25. Pitts, D.J., F.J. Coale, D.L. Myhre, and J.M. Grimm. 1989. Influence of depth to water table on yield of sugarcane grown on a sandy soil. p. 30-34. In F.J. Coale (ed.) 1989 sugarcane growers seminar. Belle Glade EREC Research Report EV-1989-3. Florida Agric. Exp. Stn.
26. Raid, R.N., D.L. Anderson, and F.J. Coale. 1989. A yield comparison of CP72-1210 and CP78-1247 and its relationship to rust. p. 22-26. In F.J. Coale (ed.) 1989 sugarcane growers seminar. Belle Glade EREC Research Report EV-1989-3. Florida Agric. Exp. Stn.
27. Snyder, G.H., D.B. Jones, and F.J. Coale. 1989. Phosphorus, potassium, silicon, and manganese fertilization of rice on organic soils in the Everglades. p. 31-40. In F.J. Coale (ed.) 1989 rice growers seminar. Belle Glade EREC Research Report EV-1989-1. Florida Agric. Exp. Stn.
28. Snyder, G.H., D.B. Jones, F.J. Coale, and C.A. Sanchez. 1989. Manganese and phosphorus studies. In F.J. Coale (ed.) Twelfth annual rice field day. Belle Glade EREC Research Report EV-1989-5. Florida Agric. Exp. Stn.
29. Whitty, E.B., C.G. Chambliss, C.K. Hiebsch, D.L. Wright, and F.J. Coale. 1989. 1989 field and forage crop variety recommendations. Agronomy Facts SS-AGR-929. Florida Coop. Ext. Serv.
30. Whitty, E.B., C.G. Chambliss, D.L. Wright, C.K. Hiebsch, and F.J. Coale (eds.). 1989. Florida field and forage crop variety report - 1988. Agronomy Research Report AY 89-07. Florida Agric. Exp. Stn.
31. Coale, F.J. 1990. Gibberellic acid seed treatment. p. 13-14 In F.J. Coale (ed.) Thirteenth annual rice field day. Belle Glade EREC Research Report EV-1990-6. Florida Agric. Exp. Sta.
32. Coale, F.J., J.A. Dusky, and D.L. Colvin. 1990. Weed control in sugarcane - 1991. Weeds in the sunshine, SS-AGR-909. Florida Coop. Ext. Serv.
33. Coale, F.J. (ed.). 1990. Thirteenth annual rice field day. Belle Glade EREC Research Report EV-1990-6.

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34. Coale, F.J. (ed.). 1990. 1990 sugarcane growers seminar. Belle Glade EREC Research Report EV-1990-3. Florida Agric. Exp. Stn. 98 pp.
35. Coale, F.J. (ed.). 1990. 1990 rice growers seminar. Belle Glade EREC Research Report EV-1990-2. Florida Agric. Exp. Stn. 67 pp.
36. Coale, F.J., and D.B. Jones. 1990. Reflood timing for ratoon rice. p. 56-66. In F.J. Coale (ed.) 1990 rice growers seminar. Belle Glade EREC Research Report EV-1990-2. Florida Agric. Exp. Stn.
37. Coale, F.J., D.B. Jones, J.A. Dusky, and D.L. Colvin. 1990. Weed control in rice - 1990. Weeds In The Sunshine SS-AGR-010. Florida Coop. Ext. Serv.
38. Coale, F.J., D.B. Jones, J.A. Dusky, and D.L. Colvin. 1990. Weed control in rice - 1991. Weeds In The Sunshine SS-AGR-10. Florida Coop. Ext. Serv.
39. Coale, F.J., and M.F. Ulloa. 1990. Post-freeze deterioration of sugarcane cultivars in Florida. p. 80-89. In F.J. Coale (ed.) 1990 sugarcane growers seminar. Belle Glade EREC Res. Rep. EV-1990-3. Florida Agric. Exp. Stn.
40. Glaz, B., and F.J. Coale. 1990. Florida's 1989 sugarcane variety census. Sugar y Azucar 85(1):19-27.
41. Izuno, F.T., C.A. Sanchez, F.J. Coale, D.B. Jones, and A.B. Bottcher. 1990. Phosphorus concentrations in drainage water from fields in the EAA and potential BMPs. p. 31-52. In F.J. Coale (ed.) 1990 sugarcane growers seminar. Belle Glade EREC Research Report EV-1990-3. Florida Agric. Exp. Sta.
42. Jones, D.B., and F.J. Coale. 1990. Main crop draining and cutting effects on ratoon crop growth and development. p. 46-55. In F.J. Coale (ed.) 1990 rice growers seminar. Belle Glade EREC Research Report EV-1990-2. Florida Agric. Exp. Stn.
43. Jones, D.B., C.W. Deren, and F.J. Coale. 1990. 1989 rice performance trials. p. 1-9. In F.J. Coale (ed.) 1990 rice growers seminar. Belle Glade EREC Research Report EV-1990-2. Florida Agric. Exp. Stn.
44. Schueneman, T.J., F.J. Coale, and D.B. Jones. 1990. A traveler's guide to Florida rice. Agronomy Facts SS-AGR-28. Florida Coop. Ext. Serv.
45. Snyder, G.H., D.B. Jones, and F.J. Coale. 1990. Phosphorus fertilization of rice on a low-P Histosol. p. 17-19. In F.J. Coale (ed.) 1990 rice growers seminar. Belle Glade EREC Res. Rep. EV-1990-2. Florida Agric. Exp. Stn.
46. Whitty, E.B., C.G. Chambliss, C.K. Hiebsch, D.L. Wright, and F.J. Coale. 1990. 1990 field and forage crop variety recommendations. Agronomy Facts SS-AGR-023. Florida Coop. Ext. Serv.
47. Whitty, E.B., C.G. Chambliss, D.L. Wright, C.K. Hiebsch, and F.J. Coale (eds.). 1990. Florida field and forage crop variety report - 1989. Agronomy Research Report AY 90-03. Florida Agric. Exp. Stn.
48. Coale, F.J. (ed.). 1991. Fourteenth annual rice field day. Belle Glade EREC Research Report EV-1991-6. Florida Agric. Exp. Stn.
49. Coale, F.J. (ed.). 1991. 1991 sugarcane growers seminar. Belle Glade EREC Research Report EV-1991-3. Florida Agric. Exp. Stn. 76 pp.
50. Coale, F.J. 1991. Performance of gibberellic acid treated seed in the EAA. p. 40-49 In F.J. Coale (ed.) 1991 rice growers seminar. Belle Glade EREC Research Report EV-1991-2. Florida Agric. Exp. Sta.
51. Coale, F.J., R.H. Cherry, and R.S. Lentini. 1991. White grubs in Florida sugarcane. CD-ROM Fact Sheet AGR 13. Florida Coop. Ext. Serv.
52. Coale, F.J., and L.E. Datnoff. 1991. Effect of seeding density on disease development and yield of Lemont rice. p. 22-23 In F.J. Coale (ed.) Fourteenth annual rice field day. Belle Glade EREC Research Report EV-1991-6. Florida Agric. Exp. Sta.
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***IMPACT:** Providing time-critical research-based information on the evolving technologies of agricultural nutrient management. These Extension publications serve as the technical foundation of the State of Maryland's Agricultural Nutrient Management Program. Several of these Extension publications have been incorporated into newly developed State regulations governing agricultural nutrient management and water quality protection.*

(authors listed in order of intellectual contribution, senior author listed first, * denotes graduate student or post-doc)

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d. Talks, Abstracts, and Other Professional Papers Presented

i. Invited presentations and expert testimony

IMPACT: Invited technology transfer to national, state, and local policy makers (U.S. House of Representative, U.S. Environmental Protection Agency, U.S. Department of Agriculture, Maryland Senate, Maryland House of

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Representatives, Maryland Departments of Agriculture, Environment, and Natural Resources, etc.) and the agricultural and environmental scientific communities.

International

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10. American Society of Agronomy Annual Meeting, Minneapolis, MN, November 7, 2000, "The phosphorus index: current versions compared", p. 322 In Annual Meeting Abstracts, Madison, WI.
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13. National Academy of Sciences, Board on Agriculture and Natural Resources Colloquium, "Science and Conservation: Farm Bill Opportunities and Challenges." Washington, DC, April 25-26, 2002. Session Reporter, "Managing Nutrient and Pesticide loss for water and air quality."
14. National Alliance of Independent Crop Consultants, Annual Meeting, Arlington, VA, January 17, 2003, "Nutrient Management in Maryland: It Happens."
15. USDA, NAREEE Advisory Board, Mid-Atlantic Listening Session, Princess Anne, MD, July 29, 2004, "The agricultural phosphorus cycle in the Mid-Atlantic Region."
16. U.S. House of Representatives, Chesapeake Bay Watershed Delegation, Informational Briefing, Washington, DC, July 6, 2006.
17. U.S. House of Representatives, House Soils Caucus, Informational Briefing, Washington, DC, September 26,

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State/Regional

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2. Alliance for the Chesapeake Bay, Solomons, MD, March 13, 1996. AManaging nutrients to prevent pollution@.
3. Maryland Department of Natural Resources, Annapolis, MD, March 20, 1997. ANitrogen and phosphorus losses from agricultural soils@.
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6. Maryland Association of Soil Conservation Districts, Annual Meeting, January 26, 1998. AManaging soil phosphorus.@
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13. Virginia Crop Production Association, Annual Meeting, Richmond, VA, January 20, 1999. APhosphorus based nutrient management: Effects on water quality and soil fertility.@
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21. Maryland Ag Commission, Salisbury, MD, April 9, 2003. "Nitrogen management and nitrogen use efficiency."
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29. Maryland House of Representatives, Environmental Matters Committee, Annapolis, MD, January 27, 2004. "Agricultural phosphorus management, fate and control."
30. Maryland Department of Agriculture Alternative Manure Management Working Group, Annapolis, MD, March 25, 2004. "Understanding phosphorus management issues on animal operations."

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31. Chesapeake Bay Media Workshop, University of Maryland Public Relations, College Park, MD, October 29, 2004. "The big picture of agricultural nutrient cycling."
32. Gallaudet University, Biology Seminar Series, Washington, DC, March 6, 2006. "Living and learning opportunities in natural resource sciences."

ii. Contributed presentations with published abstracts

IMPACT: Actively disseminating research progress to the broad scientific community.

(authors listed in order of intellectual contribution, senior author listed first, * denotes graduate student or post-doc)

International

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25. Lynch, S.V., J.T. Sims, D.R. Ware, and F.J. Coale. 1999. Form and plant availability of aluminum and phosphorus in soils amended with alum-treated poultry litter. p. 347 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
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27. Leytem, A.B., J.T. Sims, F.J. Coale, A.N. Sharpley, and W.J. Gburek. 1999. Implementing a phosphorus site index for the Delmarva Peninsula: Challenges and research needs. p. 337-338 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
28. Delorme, T.A., J.S. Angle, F.J. Coale, and R.L. Chaney. 1999. Phytoremediation of phosphorus enriched soils.

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 30. *Butler, J.S., F.J. Coale, G.K. Felton, P.M. Steinhilber, and J.T. Sims. 1999. Phosphorus leaching in manure amended soils. p.318 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
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 33. Hill, R. L., P. M. Steinhilber, and F. J. Coale. 2000. P index software for P loading risk assessment. p. 417 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
 34. Hill, R. L., P. M. Steinhilber, and F. J. Coale. 2000. Computer-based nutrient management planning using phosphorus indexing. p. 385 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
 35. Leytem, A. B., J. T. Sims, and F. J. Coale. 2000. Adapting the Phosphorus Site Index to the Delmarva Peninsula: Delaware's Experience. p. 282-301 In Managing Nutrients and Pathogens from Animal Agriculture, Camp Hill, PA. Natural Resource, Agriculture, and Engineering Service (NRAES), Ithica, NY.
 36. Maguire, R. O., J. T. Sims, and F. J. Coale. 2000. Phosphorus loss from agricultural soils by subsurface flow on the Delmarva Peninsula. p. 386 In Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
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 42. Sims, J. T., F. J. Coale, J. W. White, M. F. Lavahun, and G. K. Evanylo. 2003. Phosphorus fate and transport in biosolids amended soils III: Phosphorus forms in soils and losses in runoff from fescue pastures. WEF/AWWA/CWEA Joint Residuals and Biosolids Management Conf. , Baltimore, MD.
 43. Sadeghi, A., R. Munoz-Carpena, J. Starr, J. Meisinger, F. Coale, E. Codling, and C. Graff. 2004. Optimization of buffer-grass criteria as part of national P-Index evaluations using VFSSMOD-W model. Annual Meeting Abstracts, American Society of Agronomy, Madison, WI.
 44. Bejleri, K., J. McGrath, and F. Coale. 2007. Utilizing conservation tillage to minimize nutrient losses from poultry litter applied in grain production systems. Annual Meeting Abstracts, 2007 ASA-CSSA-SSSA International Meetings, New Orleans, LA, USA.
 45. Carroll, M., F. Coale, and C. Hapeman. 2007. Comparison of turf chemical runoff from small and large size plots. Annual Meeting Abstracts, 2007 ASA-CSSA-SSSA International Meetings, New Orleans, LA, USA.
 46. McGrath, J., F. Coale and K. Bejleri. 2007. Five years after the accelerated deployment of Maryland's phosphorus site index: a progress report. Annual Meeting Abstracts, 2007 ASA-CSSA-SSSA International Meetings, New Orleans, LA, USA.

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State / Regional

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2. Coale, F.J. 1988. 1987/88 sugarcane variety trials. In F.J. Coale (ed.) Abstracts of the 1988 sugarcane growers seminar. Sugarcane Growers Newsletter 2(3):2. Florida Coop. Ext. Serv.
3. Snyder, G.H., D.B. Jones, and F.J. Coale. 1989. Phosphorus, potassium, silicon, and manganese fertilization of rice on organic soils in the Everglades. In F.J. Coale and D.B. Jones (ed.) Abstracts of the 1989 rice growers seminar. Everglades Rice Newsletter 2(1):5. Florida Coop. Ext. Serv.
4. Raid, R.N., D.L. Anderson, and F.J. Coale. 1989. A yield comparison of CP72-1210 and CP78-1247 and its relationship to rust. In F.J. Coale (ed.) Abstracts of the 1989 sugarcane growers seminar. Sugarcane Growers Newsletter 3(3):6. Florida Coop. Ext. Serv.
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6. Coale, F.J., and M.F. Ulloa. 1989. 1988-89 Sugarcane variet trials. In F.J. Coale (ed.) Abstracts of the 1989 sugarcane growers seminar. Sugarcane Growers Newsletter 3(3):4. Florida Coop. Ext. Serv.
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11. Izuno, F.T., C.A. Sanchez, F.J. Coale, D.B. Jones, and A.B. Bottcher. 1990. Phosphorus concentrations in drainage water from fields in the EAA and potential BMPs. In F.J. Coale (ed.) Abstracts of the 1990 sugarcane growers seminar. Sugarcane Growers Newsletter 4(3):5-6. Florida Coop. Ext. Serv.
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15. Coale, F.J. 1991. Performance of gibberellic acid treated seed in the EAA. In F.J. Coale (ed.) Abstracts of the 1991 Rice Growers Seminar. Everglades Rice Newsletter 4(1):2. Florida Coop. Ext. Serv.
16. Coale, F.J., and J.J. Meisinger. 1993. Soil fertility and nutrient management. p.15-16. In Proc. 20th Annual Mid-Atlantic Conservation Tillage Conf., Maryland Coop. Ext. Serv.
17. Coale, F.J. 1993. Managing nutrients and what it means. p. 1-1A. In Proc. Southern Maryland Crops Conf. Maryland Coop. Ext. Serv.
18. Meisinger, J.J., J.P. McMurtry, F.J. Coale, A.N. Sharpley, and J.T. Sims. 1999. Poultry manure management for the Chesapeake Bay. p.8-9 In Chesapeake Bay Day at Beltsville, USDA, Agricultural Research Service, Beltsville, MD.
19. Coale, F.J. 1999. Animal feeding operation regulations and the environment: impact on the mid-Atlantic region. Soil and plant perspectives. p.209-210 In Proceedings 46th Maryland Nutrition Conference for Feed Manufacturers, University of Maryland, College Park, MD.

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20. Coale, F.J., J. T. Sims, A. N. Sharpley, W. J. Gburek, and C. M. Gross. 2000. Development of a reliable phosphorus index for assessment of the potential for phosphorus losses from Maryland's agricultural lands. Nonpoint Source Nitrogen and Phosphorus Workshop, Maryland Center for Agro-Ecology, Inc., Linthicum Heights, MD.
21. Hill, R., P. Steinhilber, and F. Coale. 2000. Phosphorus site index software for evaluating P loss risk assessment. Nonpoint Source Nitrogen and Phosphorus Workshop, Maryland Center for Agro-Ecology, Inc., Linthicum Heights, MD.
22. Coale, F. J. and J. W. White. 2001. Phosphorus fate and transport in biosolids amended soils. Bioscience Research and Technology Review Day, College Park, MD.

iii. Conference Proceedings

International

1. Coale, F. J. , J. T. Sims, A. B. Leytem, and E. Baugher. 2002. Accelerated deployment of an agricultural nutrient management tool in response to local government policy: The Maryland Phosphorus Site Index. p. 101-105 In J.H.A.M. Steenvoorden et al. (ed). Agricultural Effects on Ground and Surface Waters, Intl. Assoc. Hydrological Sci. Pub. No 273, Oxfordshire, UK.

National

1. Evangelou, V.P., L.W. Murdock, and F.J. Coale. 1983. Oil well salt brine contaminated soils: Their chemistry and reclamation. p.443-446. In Proc. Symposium Surface Mining, Hydrology, Sedimentology, and Reclamation. College of Engineering, Univ. Kentucky, Lexington, KY.
2. *Leytem, A. B., J. T. Sims, and F. J. Coale. 2000. Adapting the Phosphorus Site Index to the Delmarva Peninsula: Delaware's Experience. p. 282-301 In Managing Nutrients and Pathogens from Animal Agriculture, Camp Hill, PA. Natural Resource, Agriculture, and Engineering Serv. (NRAES), Ithica, NY.
3. Coale, F. J. 2000. Phosphorus-based nutrient management: learning from Maryland's experience. p. 9-15 In K.A. Kelling and J. L. Wedberg (ed). Proceedings of the 2000 Wisconsin Fertilizer, Aglime and Pest Management Conference, Madison, WI.
4. Sims, J. T., A. B. Leytem, and F. J. Coale. 2001. Implementing a phosphorus site index: the Delmarva experience. p. xx-xx . 2000 National Poultry Waste Mgt. Conference, Ocean City, MD.

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State / Regional

1. Coale, F.J. 1998. The science of phosphorus from agriculture and other sources entering the Chesapeake Bay. p.3-12 In B.L. Gardner and L. Koch (ed.) Economics of Policy Options for Nutrient Management and Pfiesteria. November 16, 1998, Laurel, MD. Center for Agricultural & Natural Resource Policy, University of Maryland, College Park, MD.
2. Coale, F.J. 1999. Phosphorus dynamics in soils of the Chesapeake Bay watershed: a primer. p.43-55 In A.N. Sharpley (ed.) Agricultural Phosphorus in the Chesapeake Bay Watershed: Current Status and Future Trends. University Park, PA. Chesapeake Research Consortium, Edgewater, MD.

e. Contracts and Grants

***IMPACT:** Actively sought and successfully competed for funding to support expanding research and Extension education programs in agricultural nutrient management, environmental protection, and agricultural sustainability.*

| <u>SUMMARY</u> | <u>Principal Investigator</u> | <u>Co-Principal Investigator</u> | <u>Collaborator / Cooperator</u> | <u>Total</u> |
|-------------------------------|-------------------------------|----------------------------------|----------------------------------|---------------------|
| University of Florida | \$ 192,720 | \$ 2,665,000 | \$ 1,078,554 | \$ 3,936,274 |
| <u>University of Maryland</u> | <u>\$ 1,473,466</u> | <u>\$ 2,857,680</u> | <u>\$ 2,919,278</u> | <u>\$ 7,250,424</u> |
| Total | \$ 1,666,186 | \$ 5,522,680 | \$ 3,997,832 | \$11,186,698 |

University of Florida, 1986 – 1993 (Sub-total = \$3,936,274)

University of Maryland, 1993 – present (Sub-total = \$7,250,424)

National Competitive Grants (University of Maryland)

Project: The relationship between soil test phosphorus level and the concentration of dissolved and potentially transportable phosphorus in field drainage water.

Agency: U.S. EPA, Chesapeake Bay Program, Nutrient Subcommittee

Participation: Principal Investigator, 1994-1996.

Funding: \$90,500

Project: Fall versus spring applied phosphorus and potassium fertilizers for wheat production.

Agency: Fluid Fertilizer Foundation

Participation: Cooperating Investigator, 1996.

Funding: \$6,000

Project: Safe and efficient utilization of poultry litter in the Delmarva Peninsula.

Agency: W. K. Kellogg Foundation, "Future Harvest" grant.

Participation: Co-Principal Investigator, 1994-1997.

Funding: \$130,000.

Project: Assessing the environmental fate and transformations of poultry manure applied to winter wheat.

Agency: U.S. EPA Chesapeake Bay Program, Nutrient Subcommittee

Participation: Co-Principal Investigator, 1996-1997.

Funding: \$100,000

Project: Phosphorus loss in agricultural drainage on the Delmarva Peninsula: a national soil phosphorus project.

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Agency: U. S. EPA
Participation: Co-Principal Investigator, 1998-2000.
Funding: \$160,800

Project: Drainage ditch management to mitigate nutrient loss from agroecosystems
Agency: USDA, CSREES
Participation: Co-Project Director, 2003-2005
Funding: \$572,310

Project: Mid-Atlantic regional water quality coordination project
Agency: USDA, CSREES
Participation: Cooperator, 2003-2008
Funding: \$2,234,255

Project: Protecting Surface Water Quality Through Utilization of Industrial By-Products to Reduce Nutrient Transport in Sensitive Agriculture-Dominated Ecosystems
Agency: US EPA, P3 Program
Participation: Principal Investigator, 2004-2005
Funding: \$10,000

Project: Utilizing conservation tillage to minimize nutrient losses from poultry litter applied in grain production systems
Agency: USDA, Natural Resource Conservation Service
Participation: Principal Investigator/Project Director, 2005-2008
Funding: \$262,566

Project: Controlling odor and nutrient losses to surface runoff, groundwater and air with new and conventional anure injection technologies on no-till and sod soils
Agency: USDA, Natural Resource Conservation Service
Participation: Co-Principal Investigator, 2005-2008
Funding: \$196,291

Project: Agricultural drainage ditch water treatment to remove phosphorus
Agency: USDA, Natural Resources Conservation Service
Participation: Co-Principal Investigator, 2007-2010
Funding: \$999,683

Project: Utilization of variable rate nitrogen application in the mid-Atlantic in increase nitrogen use efficiency.
Agency: USDA, Natural Resources Conservation Service – Maryland
Participation: Collaborator, 2007-2008
Funding: \$106,574

State / Regional Competitive Grants (University of Maryland)

Project: The relationship between soil test phosphorus level and the concentration of dissolved and potentially transportable phosphorus in field drainage water.
Agency: University of Maryland, College of Agriculture and Natural Resources, Competitive Grants Program
Participation: Principal Investigator, 1994-1995.
Funding: \$22,000.

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Project: The relationship between soil test phosphorus level and the concentration of dissolved and potentially transportable phosphorus in field drainage water.

Agency: Delmarva Poultry Industry, Inc.

Participation: Principal Investigator, 1995-1996.

Funding: \$11,000

Project: Equipment grant, research plot manure spreader

Agency: Delmarva Poultry Industry, Inc.

Participation: Principal Investigator, 1997

Funding: \$4,500

Project: The effect of cropping systems on the fate of residual soil nitrogen.

Agency: Maryland Grain Producers Utilization Board.

Participation: Principal Investigator, 1994-1998.

Funding: \$198,000

Project: Small grain commodity alternatives to rye cover crops for trapping residual soil nitrogen.

Agency: Maryland Grain Producers Utilization Board.

Participation: Principal Investigator, 1997-2000.

Funding: \$15,000

Project: Phosphorus leaching in manure amended soils.

Agency: University of Maryland, College of Agriculture and Natural Resources, Competitive Grants Program

Participation: Principal Investigator, 1997-1998.

Funding: \$50,000.

Project: Chemical amendment of poultry litter: stabilizing phosphorus for water quality protection and enhancing the profitability of poultry production.

Agency: Delaware Dep. Natural Resources and Environmental Control

Participation: Co-Investigator, 1998-2001

Funding: \$62,000

Project: Assessing the availability and environmental impact of phosphorus in soils amended with biosolids.

Agency: Metropolitan Washington Council of Governments.

Participation: Co-Principal Investigator, 1998-1999

Funding: \$130,240.

Project: Development of a reliable phosphorus site index for assessing the potential for phosphorus losses from agricultural lands.

Agency: Maryland Inter-Agency Nutrient Reduction Committee

Participation: Principal Investigator, 1998-2000.

Funding: \$101,400

Project: P Index software for P loading risk assessment

Agency: Maryland Inter-Agency Nutrient Reduction Committee

Participation: Collaborating Investigator, 1999-2000

Funding: \$109,800

Project: Development and evaluation of a reliable phosphorus site index for Delaware.

Agency: Delaware Dept. of Natural Resources and Environmental Control

Participation: Co-Principal Investigator, 1999-2001

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Funding: \$195,000

Project: Sustainable phosphorus fertilizer recommendations for corn production in the northeast USA.

Agency: USDA-SARE

Participation: Co-Principal Investigator, 1997-2000

Funding: \$185,560

Project: Evaluation and application of the Maryland Phosphorus Index in Wicomico, Co. using traditional and GIS systems.

Agency: Maryland Cooperative Extension Program Enhancement Awards Program

Participation: Co-Principal Investigator, 2000-2001

Funding: \$1,000

Project: Effect of field application of alum-amended poultry litter on soil pH.

Agency: Maryland Cooperative Extension Program Enhancement Awards Program

Participation: Co-Principal Investigator, 2000-2001

Funding: \$1,000

Project: Field and on-farm evaluation of the environmental impact of phosphorus in soils amended with biosolids.

Agency: Metropolitan Washington Council of Governments

Participation: Principal Investigator, 1999-2001

Funding: \$265,550

Project: Field and on-farm evaluation of the environmental impact of phosphorus in soils amended with biosolids.

Agency: Environmental Protection and Improvement Company (EPIC)

Participation: Principal Investigator, 2000-2001

Funding: \$75,000

Project: Investigations on the content and environmental behavior of endocrine disruptors in poultry litter.

Agency: Maryland Agric. Exp. Station Competitive Grants Program

Participation: Collaborator, 2001- 2002

Funding: \$20,000

Project: Agronomic and environmental evaluation of manure application to soybeans.

Agency: Maryland Soybean Board

Participation: Principal Investigator, 2002-2005

Funding: \$50,950

Project: Evaluation of late season nitrogen and fungicide applications to soybeans.

Agency: Maryland Soybean Board

Participation: Co-Principal Investigator

Funding: \$10,000

Project: Revision of the Chesapeake Bay regional nutrient management training manual

Agency: USDA, CSREES, Mid-Atlantic Regional Extension Water Quality Workgroup

Participation: Co-Principal Investigator, 2004-2005

Funding: \$25,676

Project: Utilizing conservation tillage to minimize nutrient losses from poultry litter applied in grain production systems

Agency: Maryland Grain Producers Utilization Board

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Participation: Principal Investigator/Project Director, 2005-2008
Funding: \$75,000

Project: Utilizing conservation tillage to minimize nutrient losses from poultry litter applied in grain production systems

Agency: Maryland Soybean Board
Participation: Principal Investigator/Project Director, 2005-2008
Funding: \$15,000

Contracts and Awards (University of Maryland)

Project: Nutrient management certification training manual.
Agency: Maryland Department of Agriculture.
Participation: Principal Investigator, 1994-1995.
Funding: \$20,000.

Project: Investigation of nitrogen status of soils under agricultural production.
Agency: USDA, ARS, NRI, Environmental Chemistry Laboratory
Participation: Cooperating Investigator, 1993-1998.
Funding: \$342,649

Project: Fate of sewage and septage sludge phosphorus in grain production systems.
Agency: City of Salisbury, Maryland
Participation: Principal Investigator, 1996-1997.
Funding: \$20,000

Project: Equipment grant, research plot combine
Agency: Maryland Agricultural Experiment Station
Participation: Co-Principal Investigator, 1996
Funding: \$40,000

Project: Efficacy of Eco-Min and SC27 as soil amendments for reducing phosphorus transport in field runoff water.
Agency: Martin Marietta Aggregates
Participation: Principal Investigator, 1997-98
Funding: \$8,000

Project: Agronomic efficacy of Eco-Min and SC27 in grain corn production.
Agency: CSR AgraProducts
Participation: Principal Investigator, 1997-1998
Funding: \$40,000

Project: Equipment grant, research plot manure spreader construction
Agency: W. K. Kellogg Foundation, AFuture Harvest@ grant.
Participation: Principal Investigator, 1997
Funding: \$6,000

Project: Agronomic efficacy of Eco-Min and SC27 in grain corn production.
Agency: Martin Marietta Technologies
Participation: Principal Investigator, 1998-1999
Funding: \$25,000

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Project: Chemical amendment of poultry litter: stabilizing phosphorus for water quality protection and enhancing the profitability of poultry production.

Agency: General Chemical Corporation

Participation: Co-Investigator, 1997-1998

Funding: \$51,120

Project: Use of alum and phytase to reduce the environmental impact of poultry litter and poultry-litter amended soils on water quality and improve the economic efficiency of poultry production.

Agency: Tyson Foods, Inc.

Participation: Collaborating Investigator, 1998-2000

Funding: \$100,000

Project: Agronomic evaluation of RecLime as an alternative liming material for high phosphorus soils.

Agency: RecMix of PA, Inc.

Participation: Principal Investigator, 2002-2004

Funding: \$10,000

Project: Evaluating the potential for variable rate fertilizer applications to reduce nitrogen runoff and leaching into the environment.

Agency: Chesapeake Bay Foundation

Participation: Principal Investigator, 2004-2007

Funding: \$95,000

f. Fellowships, Prizes, Awards

IMPACT: Received wide-spread recognition for exceptional contributions to the science of agriculture sustainability and natural resource protection and the associated educational programs that delivered new technologies to the community. Accolades were received on the national (U.S. Department of Agriculture), state (Governor's Citation), University (University of Maryland Alumni Association), and professional association levels for scientific, programmatic, and educational achievements.

National

U. S. Department of Agriculture, Natural Resources Conservation Service, Recognition Award, AIn recognition of your contribution to and support of nutrient management...@ May 1999.

American Society of Agronomy, Northeast Branch, Agway Award, A...for outstanding contributions to agriculture.@, June 1999.

American Society of Agronomy, Northeast Branch, Extension/Industry Award, June 2001.

Epsilon Sigma Phi, National Honorary Extension Fraternity, Tau Chapter, March 2001.

U. S. Department of Agriculture, 2003 Secretary's Honor Award, USDA Group Honor Award for Excellence, June 2003.

U. S. Department of Agriculture. 2003 USDA ARS Award for Superior Technology Transfer Achievement, December 2003.

Nominee, US EPA National Advisory Council for Environmental Policy and Technology (NACEPT), July 2004.

Nominated by American Society of Agronomy, Crop Science Society of America, Soil Science Society of America

State / Regional

University of Maryland Alumni Association, Excellence in Extension Award, University of Maryland Alumni Association, College of Agriculture and Natural Resources Chapter, 1998.

State of Maryland, Governor=s Proclamation, Governor Parris N. Glendening, A...in recognition of his outstanding individual contribution to achieving the goals of a strong and viable agricultural community

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and a clean and healthy environment through nutrient management. @ March 2000.
Gamma Sigma Delta, Extension Award of Merit, 2002.
ESCOP/ACOP Leadership Development Program, Class 14, 2004-2005.

University

The Fraternity of Alpha Zeta, Maryland Chapter, 1980.
Graduate School Fellowship Recipient, University of Kentucky, 1981-1982 and 1983-1984.
Gamma Sigma Delta Honor Society, Univ. of Kentucky Chapter, 1985.
Sigma Xi Scientific Research Society, 1988.

g. Editorships, Editorial Boards, and Reviewing Activities for Journals

IMPACT: Recognition of excellence in research and technical scientific writing. An uncommon achievement for an Extension Specialist.

Associate Editor, Agronomy Journal, 1997 - 2002
Reviewer, Agronomy Journal, 1986 – present.
Reviewer, Soil Science Society of America Journal, 1988 – present.
Reviewer, Journal of Environmental Quality, 1988 – present.
Reviewer, Journal of Production Agriculture, 1989 – 1998.
Reviewer, Journal of Soil and Water Conservation, 2004-present.

3. TEACHING AND ADVISING

a. Courses taught.

AGRO 798 - Graduate Seminar. Spring 1995
AGRO 798 - Graduate Seminar. Spring 1999
NRSC 798 – Graduate Seminar, Fall 2003
GEMS 296 – Gemstone Team Project Seminar, Fall 2003
GEMS 297 – Gemstone Team Project Seminar, Spring 2004
GEMS 396 – Gemstone Team Project Seminar, Fall 2004
GEMS 397 - Gemstone Team Project Seminar, Spring 2005
GEMS 496 – Gemstone Team Project Seminar, Fall 2005
GEMS 497 – Gemstone Team Project Seminar, Spring 2006

Guest lecturer, AGRO 789 - Graduate Seminar. Spring 1994. Using Freelance Graphics.
Guest lecturer, NRMT 489 - Wetlands Ecology. Fall 1994. "The Everglades from an agricultural perspective".
Guest lecturer, NRMT 489 - Wetlands Ecology. Fall 1995. "The Everglades from an agricultural perspective".
Guest lecturer, AGRO 407 - Cereal and Oil Crops. Spring 1996. "Managing nutrients for grain crops".
Guest lecturer, PLSC 202 – Management of horticultural crops. Spring 2003. "Soil testing".
Guest lecturer, GEMS 202 – Team Dynamics and Research Methodology, Fall 2005. "Experimental lab research".
Guest lecturer, PLSC 202 – Management of Horticultural Crops. Spring 2005. "Soil testing".
Guest lecturer, PLSC 202 – Management of Horticultural Crops. Spring 2005. "Interpreting soil testing lab reports."

b. Teaching Awards and Other Special Recognition.

IMPACT: Although not a traditional classroom teacher (80% Extension, 20% Research), my teaching skills and presentation style have been sought for some very special teaching occasions.

Keynote speech, Explore Ag and Natural Resources 1995, Governor's Summer Scholars Program, June 25, 1995.

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Keynote speech, Explore Ag and Natural Resources 1996, Governor=s Summer Scholars Program, June 23, 1996.

College of Agriculture and Natural Resources Spring Open House Lecture Series, April 19, 1999. AMaryland agriculture and natural resources.

Chair, Curriculum Development Committee, AGNR 101, 2004-2005.

Gemstone Program, 2006 Outstanding Gemstone Mentor Award

Gemstone Program, 2006 Outstanding Team Thesis Award, Team Mentor

c. Advising: Research Direction

i. Master's

| Student | Degree | Program | Years | Advisory Role |
|-----------------------|--------|---------------|-----------|-------------------------------|
| 1. Meredith Bilek | M.S. | Soil Science | 2004-2007 | Major Professor |
| 2. Jennifer S. Butler | M.S. | Soil Science | 1998-2001 | Major Professor |
| 3. Jill Dean | M.S. | Soil Science | 2004-2007 | Committee |
| 4. George N. Eriksen | M.S. | Soil Science | 1994-1997 | Major Professor |
| 5. Eric Duce | M.S. | Environ. Sci. | 2004-2005 | Advisor (Johns Hopkins Univ.) |
| 6. Joel Gruver | M.S. | Soil Science | 1996-1999 | Committee |
| 7. Kristen Hughes | M.S. | MEES | 1996-2000 | Committee |
| 8. Amy Kremman | M.S. | Soil Science | 2004-2007 | Committee |
| 9. Amy Long | M.S. | Plant Science | 2003-2005 | Committee |
| 10. Shawn T. Lucas | M.S. | Soil Science | 2000-2004 | Committee |
| 11. Jennifer A. Olear | M.S. | Soil Science | 1994-1996 | Major Professor |
| 12. David Slak | M.S. | Plant Science | 2002-2005 | Committee |
| 13. Missy Stine | M.S. | Soil Science | 1997-2000 | Committee |
| 14. Robert Vaughn | M.S. | Soil Science | 2002-2005 | Committee |
| 15. John W. White | M.S. | Soil Science | 1998-2002 | Major Professor |

ii. Doctoral

| Student | Degree | Program | Years | Advisory Role |
|---------------------|--------|--------------|--------------|----------------------------|
| 1. Sally L. Brown | Ph.D. | Soil Science | 1994-1996 | Committee |
| 2. Eaton Coding | Ph.D. | Crop Science | 1998-2000 | Committee |
| 3. Victor Currie | Ph.D. | Soil Science | 1995-2001 | Committee |
| 4. Catherine Ku | Ph.D. | Horticulture | 1993-1994 | Committee |
| 5. Joshua McGrath | Ph.D. | Soil Science | 2002-2004 | Committee (Univ. Delaware) |
| 6. Doo-Hong Min | Ph.D. | Crop Science | 1994-1998 | Committee |
| 7. David Ruppert | Ph.D. | Soil Science | 2004-present | Committee |
| 8. Mwaffak A. Taib | Ph.D. | Soil Science | 1993-1994 | Committee |
| 9. John W. White | Ph.D. | Soil Science | 2006-present | Major Professor |
| 10. Munsuk Shin Yoo | Ph.D. | Soil Science | 1993-1994 | Committee |

d. Extension Activities

Extension Education Program – University of Maryland, 1993 – present

Farmer/Grower/Manager/Citizen Educational Programs

***IMPACT:** All farmer/grower/manager/citizen educational presentations listed below were invited by the program organizing committees. The sheer number these invited grass-roots presentations is indicative of presentation quality, applicability, and reception by the target audience. There is no stronger vote of approval than being invited to speak to a local audience year after year.*

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1993

1. Dorchester County Crops Tour, Cambridge, September 31, 1993. "New Directions in Soil Fertility".
2. Talbot Corn Club, Cordova, November 17, 1993. "Presentation of Member Certificates".
3. Southern Maryland Crops Conference, Waldorf, December 2, 1993. "Managing Nutrients and What It Means".
4. 20th Annual Mid-Atlantic Conservation Tillage Conference, Hagerstown, December 16, 1993. "Fertility and Nutrient Management".

1994

1. Kent-Queen Anne's Agronomy Day, Chestertown, January 26, 1994. "Understanding Soil Tests and Fertility Recommendations".
2. Carroll County Mid-Winter Farm Meeting, Westminster, January 26, 1994. "Managing Nitrogen for More Dollars".
3. Garden Resource of Washington (GROW) Spring Fling, Washington, DC, March 5, 1994. "Soil Testing".
4. Washington County Agronomy Day Farm Winter Meeting, Hagerstown, March 8, 1994. "Managing Phosphorus".
5. Mid-Shore Irrigation Meeting, Denton, March 11, 1994. "Fertility management for Irrigated Crops".
6. Howard County Conservation Discovery Day, Clarksville, April 30, 1994. "Soil Testing and Lawn Fertility".
7. Central Maryland Plant Clinics, Westminster, May 4, May 18, June 15, June 29, 1994.
8. Eastern Shore Plant Clinics, Easton, June 7, 1994.
9. Baltimore County Field Crops Day, White House, December 8, 1994. "Managing Phosphorus".

1995

1. Delmarva Poultry Industry, Inc. Board of Directors, Salisbury, January 10, 1995. "Phosphorus loading of Maryland soils".
2. Dorchester County Crops Breakfast, Cambridge, January 26, 1995. "P loading capacity of Maryland soils".
3. Harford County Mid-winter Meeting, Street, February 16, 1995. "P loading capacity of Maryland soils".
4. Queen Anne's County Agronomy Day, Centreville, February 17, 1995. "Using sludge wisely".
5. Lower Shore Agronomy Day, Snow Hill, February 21, 1995. "Phosphorus update".
6. Montgomery/Howard County Agronomy Update, Derwood, February 22, 1995. "Fertility management".
7. Cecil County Agronomy Day, Elkton, February 23, 1995. "Soil phosphorus management".
8. Washington County Agronomy Day Farm Winter Meeting, Hagerstown, March 2, 1995. "Phosphorus: chemistry and crop response".
9. Queen Anne's County IPM Training Meeting, Centreville, March 16, 1995. "Nutrient deficiencies in crops".
10. Izzac Walton League, Easton, April 27, 1995. "Agricultural nutrient management and the Chesapeake Bay".
11. Central Maryland Plant Clinics, Westminster, May 4, June 1, June 29, July 13, 1995.

1996

1. Carroll County Mid-Winter Farm Meeting, Westminster, January 24, 1996. "Use of compost and sludge on agronomic and horticultural crops".
2. Dorchester County Crops Breakfast, Hurlock, February 1, 1996. "Soil sulfur and crop sulfur nutrition".
3. Washington County Agronomy Day, Hagerstown, February 13, 1996. "Efficient use of nitrogen and phosphorus".
4. Harford County Mid-Winter Meeting, Street, February 15, 1996. "More about soil phosphorus".
5. Lower Eastern Shore Agronomy Day, Snow Hill, February 27, 1996. "Soil phosphorus update".
6. Cecil County Agronomy Day, Elkton, February 29, 1996. "Implications of phosphorus loadings".
7. Talbot County Mid-Shore Plant Clinic, Easton, April 11, May 7, 1996.
8. Central Maryland Plant Clinics, Westminster, May 13, May 30, June 13, 1996.
9. Baltimore County Field Crops Day, White House, December 12, 1996. "Soil testing update and the P Index".

1997

1. Kent County Wheat Club, Millington, MD, January 9, 1997. "Soil fertility management for wheat".

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2. Kent - Queen Anne=s Agronomy Day, Chestertown, MD, January 22, 1997. ASoil test comparisons@.
3. Carroll County Mid-Winter Farm Meeting, Westminster, MD, January 22, 1997. ANew soil test rating system@.
4. Dorchester Field Crops Meeting, Hurlock, MD, January 28, 1997. ARecommendations update, phosphorus, nitrogen fertility of soybeans@.
5. Talbot Soybean Event, Easton, MD, January 29, 1997. ASoil fertility tests@.
6. Frederick County 1997 Winter Meeting, Walkersville, MD, February 4, 1997. AChanges in the University of Maryland soil test program@.
7. Caroline County Agronomy Meeting, Denton, MD, February 19, 1997. AManure P - a potential problem?@.
8. Lower Shore Agronomy Day, Snow Hill, MD, February 25, 1997. ASoil test update@.
9. Montgomery/Howard County Agronomy Update, Derwood, MD, February 26, 1997. ASoil test results interpretation@.
10. Carroll County Agronomy Roundtable, Westminster, MD, February 27, 1997.
11. Queen Anne=s County Agronomy Day, Centreville, MD, March 7, 1997. ANew fertilizer recommendations and getting the most for your fertilizer dollars@.
12. Delmarva Poultry Industry, Inc., Salisbury, MD, May 27, 1997. ABroiler litter nutrient management research@.
13. Central Maryland Plant Clinics, Westminster, MD, May 14, June 11, and July 9, 1997.
14. Maryland Grain Producers Association Annual Meeting, Centreville, MD, July 24, 1997. ACommodity small grain alternatives to rye cover crops for trapping residual soil nitrogen@.
15. Kent County Farm Meeting, Millington, MD, September 5, 1997. ANitrogen management for wheat production@.
16. Lower Shore Small Grain Meeting, Salisbury, MD, September 8, 1997. AWheat production, no-till and conventional tillage after corn and soybeans@.
17. Baltimore County Field Crops Meeting, White House, MD, December 11, 1997. ANew soil fertility issues@.

1998

1. Dorchester County Field Crops Meeting, Hurlock, MD, January 20, 1998. APhosphorus and Pfiesteria.@
2. Carroll County Mid-Winter Meeting, Westminster, MD, January 21, 1998. ANew information on phosphorus.@
3. Kent-Queen Anne=s Ag Day, Chestertown, MD, January 22, 1998. AThe 3 Ps: Pfiesteria, Pfosphorus, and Pfertilizer.@
4. Central Maryland Vegetable Growers Meeting, White House, MD, January 23, 1998. ANew issues with soil fertility.@
5. Brubaker Agronomic Consulting Service, Inc. Educational Meeting, Pocomoke, MD, January 28, 1998. APhosphorus management and the future impacts.@
6. Maryland Cooperative Extension, Hughes Commission Report: Impact on Agriculture, Princess Anne, MD, January 29, 1998. ASoil phosphorus and phosphorus indexing.@
7. Maryland Cooperative Extension, Hughes Commission Report: Impact on Agriculture, Princess Anne, MD, January 29, 1998. AReducing phosphorus in poultry litter with alum.@
8. Martin Elevator, Inc. Client Information Meeting, Maugansville, MD, January 30, 1998. AManaging fertilizer and nutrient usage in conjunction with the Chesapeake Bay.@
9. Kent County Agronomy Round Table, Millington, MD, February 3, 1998. APfiesteria, Pfosphorus, and Pfertilizer.@
10. Delmarva Corn and Soybean Technology Conference, Salisbury, MD, February 18, 1998. ASoluble phosphorus.@
11. Harford County Mid-Winter Educational Meeting, Street, MD, February 19, 1998. APhosphorus issues and the phosphorus index.@
12. Washington County Farm Winter Meeting, Tilghmanton, MD, February 24, 1998. ANutrient management - still

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a farm tool.@

13. Lower Shore Agronomy Day, Snow Hill, MD, February 25, 1998. A Soil indexing for phosphorus.@
14. Cecil County Agriculture Update, Chesapeake City, MD, February 26, 1998. A Phosphorus findings.@
15. Montgomery/Howard County Agronomy Update, Derwood, MD, March 4, 1998. A Nutrient management - what's next?@
16. Queen Anne's County Agronomy Day, Centreville, MD, March 6, 1998. A Phosphorus.@
17. Colonial Charolais Assoc., Clarksville, MD, July 18, 1998. A The Water Quality Improvement Act of 1998 and phosphorus management.@
18. Mid-Shore Plant Clinic, Easton, MD, September 8, 1998. A P-based nutrient management planning.@
19. Southern Maryland Crops Conference, Waldorf, MD, December 3, 1998. A Fertilization: the state of the science.@

1999

1. Maryland Turfgrass Conference, Timonium, MD, January 4, 1999. A Overview of Chesapeake Bay problems impacting agriculture.@
2. Dorchester County Field Crops Meeting, Hurlock, MD, January 26, 1999. A Phosphorus Index and the Water Quality Improvement Act of 1998.@
3. Kent County Winter Update, Millington, MD, February 4, 1999. A New nutrient management challenges.@
4. Maryland Crop Improvement Association, Easton, MD, February 10, 1999. A Nitrogen recovery using cover crops.@
5. Cecil County Agriculture Update, 1999, Fair Hill, MD, February 18, 1999. A Phosphorus Index and regulations.@
6. Cecil County Agriculture Update, 1999, Fair Hill, MD, February 18, 1999. A Micronutrients - diagnosing deficiencies.@
7. Lower Shore Agronomy Day, Snow Hill, MD, February 23, 1999. A Soil phosphorus indexing update.@
8. Montgomery/Howard County Agronomy Update, Derwood, MD, February 24, 1999. A The Water Quality Improvement Act of 1998 - Regulatory Update.@
9. Transition to Organic Farming in Kent County, Chestertown, MD, February 26, 1999. A Soil fertility issues.@
10. Queen Anne's County Agronomy Day, Centreville, MD, March 5, 1999. A Phosphorus Index.@
11. Central Maryland Soil Phosphorus Workshop, Clarksville, MD, April 6, 1999. A The Phosphorus Site Index.@
12. Baltimore County Field Crops Day, Upperco, MD, December 9, 1999. A Fertility management using the phosphorus index.@

2000

1. Maryland Organic Food & Farming Assoc., Annapolis, MD, January 8, 2000. "Applying the P Site Index to organic farming systems."
2. Carroll County Mid-Winter Meeting, Westminster, MD, January 19, 2000. "P Site Index."
3. Mid-Shore Soybean / Small Grain Event, Easton, MD, February 8, 2000. "Phosphorus."
4. Harford County Mid-Winter Educational Meeting, Street, MD, February 17, 2000. "Maryland nutrient management: P-site index."
5. Kent County Soil Fertility & Nutrient Management Update, Millington, MD, February 17, 2000. "Current nutrient management issues."
6. Mid-Atlantic No-Till Conference, Hagerstown, MD, February 24, 2000. "Managing phosphorus for no-till production and the environment: Part I."
7. Mid-Atlantic No-Till Conference, Hagerstown, MD, February 24, 2000. "The phosphorus index: a site assessment tool: Part I"
8. Mid-Atlantic No-Till Conference, Hagerstown, MD, February 24, 2000. "Managing phosphorus for no-till production and the environment: Part II."
9. Mid-Atlantic No-Till Conference, Hagerstown, MD, February 24, 2000. "The phosphorus index: a site assessment tool: Part II"
10. Queen Anne's County Agronomy Day, Centreville, MD, March 3, 2000. "Phosphorus Index."

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2001

1. Carroll County Mid-winter Meeting, Westminster, MD, January 17, 2001. "Phosphorus nutrient management."
2. Dorchester County Field Crops Meeting, Hurlock, MD, January 24, 2001. "Phosphorus site index."
3. Cecil County Farmers' Breakfast, Chesapeake City, MD, January 26, 2001. "Increasing corn production efficiency."
4. Kent County Nutrient Applicator Training, Chestertown, MD, February 6, 2001. "Soil testing and the phosphorus site index."
5. Southern Maryland Crops Conference, Waldorf, MD, November 27, 2001. "Nutrient management science update."
6. Baltimore County Field Crops Day, Upperco, MD, December 6, 2001. "What growers need to know about the P Site Index."

2002

1. Lower Shore Agronomy Day, Princess Anne, MD, February 27, 2002. "Agronomic nutrient management update."
2. Kent County Agronomy Meeting, Chestertown, MD, February 7, 2002. "Update on P and N management."
3. Martin's Elevator, Inc., Maugansville, MD, March 14, 2002. "Managing fertilizer and pesticide usage in conjunction with the Chesapeake Bay."
4. Montgomery/Howard County Agronomy Update, Derwood, MD, February 28, 2002. "Nitrogen management on small grains."
5. Mid-Shore Plant Clinic, Easton, MD, April 2, 2002. "Nutrient management for drought conditions."
6. Montgomery County Master Gardeners, Derwood, MD, July 11, 2002. "Interpretation of soil test data."
7. Baltimore County Field Crops Day, Forrester, MD, December 5, 2002. "Nitrogen management after a drought."
8. Lower Shore Small Grain Breakfast, Salisbury, MD, September 10, 2002. "Management of potential fertility carryover from dryland corn in small grain production."

2003

1. Dorchester County Field Crops Meeting, Hurlock, MD, January 22, 2003. "Soil fertility and nutrient management update."
2. Maryland Grape Growers Association, West Friendship, MD, March 1, 2003. "Soil analysis."
3. Maryland Commodity Classic, Centreville, MD, July 24, 2003. "Agronomic and environmental evaluation of manure application to soybeans."
4. Mid-Shore Plant Clinic, Easton, MD, May 27, 2003. "Corn fertilizer management."
5. "State Circle", Maryland Public Television, July 27, 2003. "Assessing nutrient losses from farmland."

2004

1. Maryland Vegetable Growers' Meeting, Upperco, MD, January 23, 2004. "Phosphorus issues for vegetable growers."
2. Caroline County Agronomy Meeting, Denton, MD, March 22, 2004. "pH and lime".
3. Montgomery/Howard County Agronomy Update, Derwood, MD, February 25, 2004. "Fertility management in corn and soybeans".
4. Prince George's County Soil Conservation District, Cooperator Awards Dinner, Brandywine, MD, April 30, 2004. "Management of soil phosphorus".
5. Mid-Shore Plant Clinic, Easton, MD, June 1, 2004. "Nutrient management with P-based plans."

2005

1. 2005 Maryland 4-H Teen Focus Conference, College Park, MD, June 23, 2005. "Introduction to natural resource sciences and landscape architecture."

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1. Talbot Corn Club & Soybean Improvement Dinner, Easton, MD, January 12, 2006. "Corn and soybean research and education programs at the University of Maryland."

Research Field Day Presentations

IMPACT: Demonstrating field research in action stimulates community interest and emphasizes timeliness of research program objectives and fosters support from the end-users of the research. Field Day tour presentations are invited by the program organizing committees and a very limited number of presentations (usually 4 to 5) are included in a single tour. Therefore, inclusion in Field Day tours is recognition of field research excellence.

1994

1. Lower Eastern Shore Small Grains Field Day, LESREC-Poplar Hill, May 19, 1994. "Nitrogen Fate in Different Crop Rotations".
2. Eastern Shore Small Grains Tour, LESREC-Poplar Hill, May 26, 1994. "Nitrogen Fate in Crop Rotations".
3. Southern Maryland Ag Field Day, CMREC-Upper Marlboro, July 27, 1994. "Phosphorus Loading Capacity of Maryland Soils".
4. Somerset County Ag Tour, Princess Anne, July 27, 1994. "Phosphorus Loading Capacity of Maryland Soils".
5. Lower Eastern Shore REC - Poplar Hill Facility Field Day, August 9, 1994. "Phosphorus Loading Capacity of Maryland Soils" and "Fate of Nitrogen in Multi-Year Crop Rotations".
6. Wye REC Field Day, August 18, 1994. "Residual Nitrogen Management".
7. Wye REC Field Day, August 18, 1994. "Manure Loading Capacity of Soils".
8. Central Maryland REC Beltsville Facility Field Day, August 25, 1994. "Phosphorus Loading Capacity of Maryland Soils".
9. Eastern Shore Soil Fertility Tour, September 1, 1994. "Phosphorus Loading Capacity of Maryland Soils" and "Fate of Residual Corn Fertilizer Nitrogen Under Different Crop Rotations".
10. Western Maryland Ag Field Day, WMREC, Sept. 8, 1994. "Phosphorus Loading Capacity of Maryland Soils".

1995

1. Conservation Discovery Day 95, Howard County Fairgrounds, April 8, 1995. "The importance of soil testing".
2. Lower Eastern Shore Small Grains Field Day, LESREC-Poplar Hill, May 18, 1995. "Nitrogen Fate in Different Crop Rotations".
3. Eastern Shore Small Grains Tour, LESREC-Poplar Hill, May 18, 1995. "Nitrogen Fate in Different Crop Rotations".
4. Maryland Grain Producer's Utilization Board Field Day, Wye REC, July 27, 1995. "Nitrogen Fate in Different Crop Rotation Systems".
5. Lower Eastern Shore REC - Poplar Hill Facility Field Day, August 8, 1995. "Nitrogen Fate in Different Crop Rotation Systems".
6. Eastern Shore Soil Fertility Tour, Cambridge, August 9, 1995. "Nitrogen Fate in Different Crop Systems".
7. Western Maryland REC Field Day, August 10, 1995. "Phosphorus loading capacity of Maryland soils".

1996

1. Kent County Winter Wheat Field Day, Willard, April 4, 1996. AWheat nitrogen management@.
2. Central Maryland Research & Education Center, Clarksville Facility Field Day, May 4, 1996. ASoil phosphorus loading@.
3. Lower Eastern Shore Research & Education Center, Poplar Hill Facility Small Grains Field Day, May 16, 1996. AWheat deep nitrate test@.
4. Maryland Grain Producer's Utilization Board Field Day, Centreville, July 25, 1996. "Nitrogen fate in different crop rotation systems".
5. Eastern Shore Soil Fertility Tour, Lower Eastern Shore Research & Education Center, Poplar Hill Facility,

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August 15, 1996. ANitrogen fate in crop rotation systems@.

6. Central Maryland Research & Education Center, Beltsville Facility Field Day, August 17, 1996. ANitrogen fate in crop rotation systems@.
7. Eastern Shore Compost and GPS Field Day, Galena, October 10, 1996. A Using of composted poultry manure@.

1997

1. Twilight Small Grains Tour, Wye REC, May 21, 1997. ACommodity small grain alternatives to rye cover crops for trapping residual soil nitrogen@.
2. Northeastern Branch, American Society of Agronomy, Field Crops Tour, Wye REC, July 15, 1997. ACommodity small grain alternatives to rye cover crops for trapping residual soil nitrogen@.
3. Northeastern Branch, American Society of Agronomy, Field Crops Tour, Wye REC, July 15, 1997. ASoil fertility effects of different-aged poultry litter composts on corn production@.
4. Lower Eastern Shore Research & Education Center Field Day, Poplar Hill Facility, August 6, 1997. ASoil fertility effects of different-aged poultry litter composts on corn production@.
5. Wye Research & Education Center Field Day, August 21, 1997. ACommodity small grain alternatives to rye cover crops for trapping residual soil nitrogen@.

1998

1. Small Grain Twilight Tour, Wye REC, May 20, 1998. AFall nitrogen fertilization of wheat.@
2. Dairy Facilities Open House and Field Day, Central Maryland Research and Education Center, Clarksville Facility, July 9, 1998. APhosphorus legislation and its impact on dairy producers.@
3. Upper Marlboro Facility Field Day, Central Maryland Research and Education Center, July 29, 1998. AChallenges of phosphorus-based nutrient management.@
4. Lower Eastern Shore Small Grains Twilight Tour, Poplar Hill, MD, May 18, 1999. ACommodity small grains for
5. Western Maryland Field Day, WMREC, Keedysville, MD, July 30, 1998. AP-based nutrient management.@
6. Lower Eastern Shore Field Day, Lower Eastern Shore REC, August 5, 1998. AManaging of soils with high phosphorus levels.@
7. American Society of Agronomy, Annual Meeting Agronomy Tour, Wye REC, October 21, 1998. AEeffect of starter fertilization on corn yield in high phosphorus soils.@

1999

1. Lower Eastern Shore Small Grains Twilight Tour, Poplar Hill, MD, May 18, 1999. ACommodity small grains for winter cover crops.@
2. Upper Marlboro Facility Field Day, Central Maryland Research and Education Center, July 28, 1999. AThe Phosphorus Index.@
3. Lower Eastern Shore Research & Education Center Field Day, August 4, 1999. APhosphorus fertility update: Influence of starter fertilizer on no-till & conventional corn.@
4. Wye Research & Education Center Field Day, August 19, 1999. AAcidification of high pH sewage sludge amended soils.@
5. Southern States Cooperative GrowMaster Field Tour, Wye Research and Education Center, August 24, 1999. ASoil fertility and nutrient management field research.@

2000

1. Lower Eastern Shore Small Grains Twilight Tour, Poplar Hill, MD, May 18, 2000. "Residual soil nitrogen management."
2. Metropolitan Washington Council of Governments, Blue Plains Regional Committee, Central Maryland Research & Education Center, June 12, 2000. "Biosolids P runoff research."
3. Wye Research & Education Center Field Day, August 17, 2000. "The Phosphorus Site Index: Estimating the potential for phosphorus loss in field drainage water."

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2001

1. Small Grain Twilight Tour, Wye REC, May 22, 2001. "Nitrogen fertilization management."
2. Lower Eastern Shore Agronomy Field Day, Poplar Hill, MD, August 2, 2001. "Taking a second look at good agronomic practices with an eye on environmental protection."
3. Agricultural Practices for the Protection of Surface Water: Management of Biosolids Phosphorus and Implementation of the Conservation Reserve Program, Cumberland County, VA, October 31, 2001. "Description of research to quantify biosolids P bioavailability."

2002

1. Maryland Soybean Board, Research Tour, Wye REC, August 14, 2002. "Agronomic and environmental evaluation of manure application to soybean."
2. Small Grains and Corn Twilight Meeting, Wye REC, September 4, 2002. "Utilizing leftover nitrogen from drought corn."

2006

1. Maryland Commodity Classic Field Tour, Wye REC, July 27, 2006. "Utilizing minimum tillage to conserve broiler litter nutrients in no-till corn production systems."

Professional Technical Training Sessions

***IMPACT:** Professional technical training is the primary focus of my Extension education efforts. I am a lead educator for the Maryland Agricultural Nutrient Management Program and am a very active member of the teaching team for the Mid-Atlantic Crop Management School and Certified Crop Advisors Programs. I also provide technical training for professionals of numerous public agencies (U.S. Environmental Protection Agency, Maryland Department of the Environment, Maryland Department of Agriculture) and agricultural industry and environmental preservation groups.*

1993

1. Maryland Department of Agriculture, Nutrient Management Program Continuing Education Training, November 22, 1993. "Soil Testing Philosophies and Soil Nitrogen Testing".
2. Southern States Cooperative Long Term Outlook Meeting, December 15, 1993. "Managing Nutrients in the Years Ahead".
3. Maryland Department of Agriculture, Nutrient Management Program Continuing Education Training, December 10, 1993. "Soil Testing Philosophies and Soil Nitrogen Testing".

1994

1. Regional Certified Crop Advisor (CCA) Awareness Training, Northeastern Weed Sci. Soc. Am. Meeting, January 6, 1994. "Soil and Water Management".
2. Willard Agri-Service Employee Continuing Education Program, January 13, 1994. "Soil Nitrogen & Soil Phosphorus".
3. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, February 7, 1994. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
4. USEPA, Chesapeake Bay Program, Scientific Technical Advisory Committee Conference, April 13, 1994. "Phosphorus Based Organic Waste Disposal".
5. American Geophysical Union 1994 Spring Meeting, May 25, 1994. "Maryland's Nutrient Management Program".
6. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, July 20, 1994. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
7. Southern States Cooperative Advanced Agronomy School, August 2, 1994. "Agricultural Nutrient Management".

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8. CES Nutrient Management Program Summer Meeting, August 4, 1994. "Appropriate Use of Soil Test Information".

1995

1. Baltimore Metropolitan Council Reservoir Technical Group, Baltimore, February 9, 1995. "Soil phosphorus dynamics".
2. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, January 19, 1995. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
3. Soil and Water Conservation Society, Nutrient Management Technical Meeting, Dauphin, PA, March 20, 1995. "Phosphorus research update".
4. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, March 24, 1995. "Potassium in the soil - plant system".
5. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, March 24, 1995. "Micronutrients".
6. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, April 11, 1995. "Potassium in the soil - plant system".
7. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, April 11, 1995. "Micronutrients".
8. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, Annapolis, July 10, 1995. "Basis soil science".
9. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, Annapolis, July 10, 1995. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
10. Nutrient Management Consultant Training, North East, August 7, 1995. "PSNT theory and update".
11. National Stone Association, Ag Lime Seminar, Baltimore, August 28, 1995. "Soil testing and liming".
12. Maryland Sea Grant College, Agriculture, Nutrients, and Eutrophication in the Chesapeake Bay Training Session, Riverdale, September 29, 1995. "Nitrogen and phosphorus in the environment: recommended practices in agriculture".
13. Maryland Department of Agriculture, Urban Nutrient Management Program, Annapolis, November 7, 1995. "Relating soil conditions to nutrient management".
14. Agronomy and Environmental Issues Update, Riverdale, November 8, 1995. "PSNT update".
15. Agronomy and Environmental Issues Update, Riverdale, November 8, 1995. "Soil testing update".
16. Agronomy and Environmental Issues Update, Riverdale, November 9, 1995. "Phosphorus update".
17. Mid-Atlantic Crop Management School, Calverton, December 5, 1995. "Advanced soil fertility principles: soil acidity I".
18. Mid-Atlantic Crop Management School, Calverton, December 5, 1995. "Advanced soil fertility principles: soil acidity II".
19. Mid-Atlantic Crop Management School, Calverton, December 6, 1995. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
20. Mid-Atlantic Crop Management School, Calverton, December 7, 1995. "Phosphorus management".
21. Mid-Atlantic Crop Management School, Calverton, December 7, 1995. "Soil nitrogen dynamics".

1996

1. Delmarva Poultry Industry, Inc. Research Advisory Committee, Salisbury, January 19, 1996. APhosphorus loading of Maryland soils@.
2. Maryland Association of Soil Conservation Districts, Annapolis, January 22, 1996. ASoil phosphorus dynamics and the PSNT@.
3. Home and Garden Information Center Telephone Consultant Training, Clarksville, January 25, 1996. ASoil nutrient dynamics@.

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4. Redland/Genstar Employee Education Program, Texas, February 23, 1996. ASoil pH, liming, and liming materials@.
5. Alliance for the Chesapeake Bay Nutrient Management Workshop, Solomons, March 13, 1996. AManaging nutrients to prevent pollution - technical foundations@.
6. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, March 29, 1996. AHydrology and its influence on plant nutrient movement@.
7. Upper Western Shore Tributary Team, Gunpowder State Park, June 24, 1996. ANitrogen and phosphorus cycling in soils@.
8. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, Annapolis, July 17, 1996. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
9. CES Nutrient Management Counsultant Continuing Education Program, August 13, 1996. ASoil testing and \ recommendations update@.
10. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, October 21, 1996. ASoil phosphorus dynamics@.
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, October 21, 1996. ASoil pH and liming@.
12. Maryland Ag Commission, Upper Marlboro, November 13, 1996. AManaging soil phosphorus@.
13. Agronomy and Environmental Issues Update, Riverdale, November 13, 1996. "Soil test interpretation".
14. Agronomy and Environmental Issues Update, Riverdale, November 13, 1995. "Crop fertility recommendations".
15. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, November 14, 1996. ARelationships between soil test phosphorus and soil dissolved phosphorus@.
16. Mid-Atlantic Crop Management School, Dover, DE, November 19, 1996. "1990s and beyond: nutrient management for Delaware and Maryland: Part I".
17. Mid-Atlantic Crop Management School, Dover, DE, November 19, 1996. "1990s and beyond: nutrient management for Delaware and Maryland: Part II".
18. Mid-Atlantic Crop Management School, Dover, DE, November 19, 1996. "Soil reaction and liming: Part I".
19. Mid-Atlantic Crop Management School, Dover, DE, November 19, 1996. "Soil reaction and liming: Part II".
20. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, Annapolis, December 9, 1996. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".

1997

1. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, February 18, 1997. AMatching cropping systems and manure utilization@.
2. Delmarva Corn and Soybean Technology Conference, Salisbury, MD, February 13, 1997. ASulfur management@.
3. Congressman Wayne Gilchrest, U.S. House of Representatives, informational meeting, Washington, DC, March 11, 1997. AAgricultural phosphorus losses and water quality@.
4. Delmarva Poultry Industry, Inc. Board of Directors, Salisbury, MD, March 11, 1997. AThe relationship between soil test phosphorus level and the concentration of dissolved and potentially transportable phosphorus in field drainage water@.
5. Maryland Department of Natural Resources, Annapolis, MD, March 20, 1997. ANitrogen and phosphorus losses from agricultural soils@.
6. USEPA Chesapeake Bay Program, Nutrient Subcommittee, Annapolis, MD, May 28, 1997. ARelationship between soil test phosphorus and dissolved and potentially transportable phosphorus in field drainage water@.
7. Maryland Department of Agriculture, Phosphorus Task Force, Annapolis, MD, June 23, 1997. AUsing soil test phosphorus as a predictor of runoff soluble phosphorus@.
8. Maryland Association of County Agricultural Agents, Ocean City, MD, June 30, 1997. ANutrients and the land-

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9. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 10, 1997. ASoil phosphorus cycle@.
10. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 10, 1997. APhosphorus management tools@.
11. Northeastern Branch, American Society of Agronomy, College Park, July 15, 1997. AMunicipal solid waste compost and nitrogen management@.
12. Maryland CES Nutrient Management Program, Consultant Training, Bowie, MD, September 9, 1997. ASoil phosphorus and the phosphorus index@.
13. Maryland State Soil Conservation Committee, Annapolis, MD, September, 18, 1997. ASoil phosphorus and phosphorus losses from agricultural land@.
14. USDA, Mid-Atlantic Issues for Animal Agriculture and Nutrient Management, Washington, DC, September 29, 1997. ATechnical briefing on phosphorus land-based issues@.
15. Maryland Department of Agriculture, Nutrient Management Program, Annapolis, MD, November 4, 1997. ASoil and manure sampling, nutrient testing, analysis and assessment"
16. Martin Marietta Aggregates, Inc., Laytonsville, MD, November 14, 1997. AEfficacy of Eco-Min and SC27 in Maryland crop production systems@.
17. Mid-Atlantic Crop Management School, Ocean City, MD, November 18, 1997. ASulfur nutrition of agronomic crops: Part I@.
18. Mid-Atlantic Crop Management School, Ocean City, MD, November 18, 1997. ASulfur nutrition of agronomic crops: Part II@.
19. Mid-Atlantic Crop Management School, Ocean City, MD, November 19, 1997. AControlling nutrient losses from agricultural soils: Part I@.
20. Mid-Atlantic Crop Management School, Ocean City, MD, November 20, 1997. AControlling nutrient losses from agricultural soils: Part II@.
21. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, December 3, 1997. AHow to run field plots and demos@.
22. Maryland Agriculture & Natural Resources Extension Program Update, Bowie, MD, December 5, 1997. APhosphorus issues and the phosphorus index@.
23. Delmarva Poultry Industry, Inc. Environmental Issues Research Symposium, Georgetown, DE, December 5, 1997. APhosphorus balance in the region and cropping strategies@.
24. Delmarva Poultry Industry, Inc. Environmental Issues Research Symposium, Georgetown, DE, December 5, 1997. ALitter additives and soil amendments@.

1998

1. USEPA Chesapeake Bay Program, Annapolis, MD, January 9, 1998. "Amending poultry litter and coastal plain soils to protect water quality and improve agricultural profitability."
2. Maryland Association of Soil Conservation Districts, Annual Meeting, Annapolis, MD, January 26, 1998. AManaging soil phosphorus.@
3. Metropolitan Washington Council of Governments, Potential impact of Maryland=s proposed nutrient management legislation on biosolids land application, Washington, DC, February 20, 1998. A Current research regarding phosphorus in soils.@
4. Maryland Cooperative Extension Crops, Soils, and Environmental Issues In-service Training, College Park, MD, March 11, 1998. APhosphorus management update.@
5. Maryland Cover Crops Conference, Easton, MD, March 18, 1998. ACommodity small grain alternatives to rye cover crops.@
6. Chesapeake Water Environment Assoc., Inc., Biosolids and Residuals Management Committee, Newark, DE, March 31, 1998. APhosphorus management issues and concerns.@
7. USEPA Chesapeake Bay Program, Scientific & Technical Advisory Committee Conference, Agricultural phosphorus in the Chesapeake Bay watershed: current status and trends. State College, PA, April 7, 1998.

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ASources of phosphorus in the Bay watershed.@

8. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, May 21, 1998.
9. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, May 25, 1998.
10. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, June 16, 1998.
11. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, June 30, 1998.
12. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, July 9, 1998.
13. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 13, 1998. ASoil phosphorus dynamics@.
14. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 20, 1998. AThe phosphorus site index@.
15. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 20, 1998. AP site index exercise@.
16. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 24, 1998. AThe phosphorus site index@.
17. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 24, 1998. AP site index exercise@.
18. USEPA Chesapeake Bay Program Nutrient Subcommittee, Annapolis, MD, July 28, 1998. ASoil P dynamics, farm P balances, and P loss pathways.@
19. Virginia Department of Conservation and Recreation, Virginia Nutrient Management Program Continuing Education, Richmond, VA, July 31, 1998. APhosphorus - review of the nutrient.@
20. Virginia Department of Conservation and Recreation, Virginia Nutrient Management Program Continuing Education, Richmond, VA, July 31, 1998. APhosphorus - implications of recent research & affects on nutrient management strategies.@
21. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, August 31, 1998. AAdvanced phosphorus management@.
22. Choptank Tributary Strategy Team, Denton, MD, September 10, 1998. AThe phosphorus cycle and modes of phosphorus transport from agricultural fields to waterways.@
23. Maryland Cooperative Extension, Nutrient Management Update, Laurel, MD, September 14, 1998. AP site index and P-based planning.@
24. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, September 18, 1998.
25. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, September 28, 1998.
26. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, October 6, 1998.
27. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, October 23, 1998.
28. USEPA Chesapeake Bay Program, Nutrient Subcommittee Annual Technical Exchange, Salisbury, MD, October 27, 1998. ARecent advances in phosphorus science.@
29. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, October 29, 1998.
30. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, November 5, 1998.
31. Center for Agricultural and Natural Resource Policy, University of Maryland, Conference: Pfiesteria: Where do we go from here? Laurel, MD, November 16, 1998. AThe science of nutrients from agriculture and other

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32. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, November 18, 1998. AIntegration of waste management systems and nutrient management planning@.
33. Sierra Club Maryland Chapter, Wye Mills, MD, November 18, 1998. APhosphorus dynamics and phosphorus transport in agricultural soils.@
34. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, November 30, 1998.
35. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, December 2, 1998. ASoil and manure sampling, nutrient testing, analysis and assessment@.
36. Mid-Atlantic Crop Management School, Ocean City, MD, December 9, 1998. AFall nitrogen applications on small grains: Part I@.
37. Mid-Atlantic Crop Management School, Ocean City, MD, December 9, 1998. AFall nitrogen applications on small grains: Part II@.
38. Maryland Department of Health and Mental Hygiene, Division of Milk Control Joint Dairy Industry - Health Department Conference, Hagerstown, MD, December 15, 1998. AThe impact of the water quality improvement act on the Maryland dairy industry.@
39. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, December 16, 1998.

1999

1. Maryland Agricultural Commission, Annapolis, MD, January 13, 1999. ASoil and environmental phosphorus concerns.@
2. Martin Marietta Technologies, Bethesda, MD, January 14, 1999. ANutrient management research and the potential utility of Eco-Min and SC27.@
3. Virginia Crop Production Association, Annual Meeting, Richmond, VA, January 20, 1999. APhosphorus based nutrient management: Effects on water quality.@
4. Virginia Crop Production Association, Annual Meeting, Richmond, VA, January 20, 1999. APhosphorus based nutrient management: Effects on soil fertility.@
5. Maryland Association of Soil Conservation Districts, Annual Meeting, Annapolis, MD, January 25, 1999. AResearch on P-based nutrient management planning.@
6. Maryland Association of Soil Conservation Districts, Annual Meeting, Annapolis, MD, January 25, 1999. ANitrogen and phosphorus balance in soils and the Phosphorus Site Index.@
7. Martin Marietta Technologies, Baltimore, MD, February 5, 1999. AEfficacy of Eco-Min and SC27 in corn grain production systems.@
8. USDA, NRCS, Beltsville, MD, February 19, 1999. ADevelopment of Maryland=s Phosphorus Site Index.@
9. National Association of State Universities and Land-Grant Colleges, Agricultural Research and Education Serving the Nation: A University Exhibition and Reception on Capitol Hill, Washington, DC, March 2, 1999. ANutrient management for agricultural profitability and water quality protection: science-based solutions for Delaware and Maryland agriculture.@
10. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 10, 1999. AFundamentals of soil reaction@.
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 10, 1999. ALiming materials exercise@.
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 10, 1999. ADiagnosing micronutrient problems.@
13. Maryland Cooperative Extension In-Service Training, Stevensville, MD, March 12, 1999. AThe Phosphorus Site Index & the regulations.@
14. 46th Maryland Nutrition Conference for Feed Manufacturers, Baltimore, MD, March 12, 1999. AAnimal feeding operation regulations and the environment: impact on the mid-Atlantic region. Soil and plant perspectives.@
15. Forum: Application of poultry manure on forest lands as fertilizer, Ocean City, MD, March 18, 1999.

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16. Maryland Cover Crop Task Force, Wye Mills, MD, March 25, 1999. ASmall grain cover crop nitrogen accumulation research.@
17. Metropolitan Washington Council of Governments, Washington, DC, March 26, 1999. ADesigning a field research program for the Blue Plains biosolids phosphorus study.@
18. Metropolitan Washington Council of Governments, Washington, DC, March 26, 1999. "Assessing the availability and environmental impact of phosphorus in soils amended with municipal biosolids."
19. Middle Potomac Tributary Team, Laurel, MD, June 2, 1999. APhosphorus cycling and transport in soils.@
20. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, June 11, 1999.
21. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, June 30, 1999. ASoil and manure sampling, nutrient analysis and assessment@.
22. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, July 27, 1999.
23. Somerset County Soil Conservation District, Princess Anne, MD, July 28, 1999. ASoil P management research.@
24. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, August 17, 1999.
25. Maryland Cooperative Extension In-Service Training, Annapolis, MD, August 26, 1999. AIntroduction to the Phosphorus Site Index concept in Maryland.@
26. Maryland Cooperative Extension In-Service Training, Annapolis, MD, August 26, 1999. AInterpretation of the Maryland Phosphorus Site Index final categories.@
27. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, September 1, 1999.
28. Maryland Agricultural Commission, Annapolis, MD, September 8, 1999. APhosphorus Index update.@
29. Maryland Cooperative Extension In-Service Training, Annapolis, MD, September 15, 1999. AIntroduction to the Phosphorus Site Index concept in Maryland.@
30. Maryland Cooperative Extension In-Service Training, Annapolis, MD, September 15, 1999. AIntroduction to the Phosphorus Site Index calculation.@
31. Maryland Cooperative Extension In-Service Training, Annapolis, MD, September 15, 1999. AInterpretation of the Maryland Phosphorus Site Index final categories.@
32. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 29, 1999. ASoil phosphorus cycle.@
33. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 29, 1999. AIntroduction to the Phosphorus Site Index.@
34. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 15, 1999. AIntroduction to the Phosphorus Site Index concept in Maryland.@
35. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 15, 1999. AIntroduction to the Phosphorus Site Index calculation.@
36. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 15, 1999. AInterpretation of the Maryland Phosphorus Site Index final categories.@
37. Chesapeake Water Environment Association, Inc., Washington, DC, October 20, 1999. A The Maryland Phosphorus Site Index.@
38. Maryland Association of County Agricultural Agents, Beltsville, MD, November 10, 1999. ASoil fertility & nutrient management.@
39. Metropolitan Washington Council of Governments, Washington, DC, November 12, 1999. ARegional P Site Index development.@
40. Delmarva Nutrient Management Legislation Workshop, Salisbury, MD, November 17, 1999. AStrategies for educational programs to comply with Delmarva legislative mandates.@

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41. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, November 19, 1999. AIntroduction to the Phosphorus Site Index concept in Maryland.@
42. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, November 19, 1999. AIntroduction to the Phosphorus Site Index calculation.@
43. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, November 19, 1999. AInterpretation of the Maryland Phosphorus Site Index final categories.@
44. Maryland House of Representatives, Environmental Matters Committee, Annapolis, MD, December 14, 1999. ADevelopment of the Maryland Phosphorus Site Index.@

2000

1. U. S. Environmental Protection Agency, Region 3 and National Policy Staff, Harrisburg, PA, January 13, 2000. "Overview of the science of phosphorus."
2. 2000 Wisconsin Fertilizer, Aglime and Pest Management Conference, Madison, WI, January 18, 2000. "Phosphorus-based nutrient management: learning from Maryland's experience."
3. Maryland Association of Soil Conservation Districts, 2000 Winter Meeting, Annapolis, MD, January 24, 2000. "Overview of the Maryland P Site Index."
4. Maryland Association of Soil Conservation Districts, 2000 Winter Meeting, Annapolis, MD, January 24, 2000. "Using the Maryland P Site Index."
5. Mid-Atlantic Soil & Plant Analysis Workgroup, Richmond, VA, February 16, 2000. "The Maryland phosphorus site index."
6. Maryland Department of Agriculture, Nutrient Management Program In-service Training, Beltsville, MD, February 29, 2000. "Soil sampling."
7. Crop Decisions Magazine, Certified Crop Advisor Continuing Education Self-Study Course, February 2000. "Supplement N applications with municipal waste."
8. Maryland Dairy Industry Association Board of Directors, College Park, MD, March 2, 2000. "Impact of pending nutrient management regulations on dairy operations."
9. World Bank, Nutrient Management Workshop, College Park, MD, April 5, 2000. "What is nutrient management, what are its components and how is it implemented?"
10. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, April 6, 2000.
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 13, 2000. AIntroduction to the Phosphorus Site Index concept in Maryland.@
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April, 13, 2000. AIntroduction to the Phosphorus Site Index calculation.@
13. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, , April, 13, 2000. AInterpretation of the Maryland Phosphorus Site Index final categories.@
14. Maryland Department of Natural Resources, Ecosystems Management Training, Annapolis, MD, April 20, 2000. "Maryland's agricultural nutrient management regulations: removing a mosquito from a friend's forehead with a sledgehammer."
15. Maryland Cooperative Extension Nutrient Management Program In-service Training, Clinton, MD, May 17, 2000. "Fine-tuning use of the Phosphorus Site Index."
16. Northeast Dairy Consortium, Environmental Management of Dairy Farms: A Training for Extension Educators in the Northeast, Hagerstown, MD, June 5, 2000. "The phosphorus problem."
17. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, June 5, 2000.
18. American Society of Agronomy, Northeastern Branch, Crop Advisor Workshop, Newark, DE, June 21, 2000. "Development and evolution of the phosphorus site index."
19. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 5, 2000. "Soil and manure sampling, nutrient analysis and assessment."
20. Waste Management, Inc. / BioGro Workshop, Annapolis, MD, July 11, 2000. "The Maryland Phosphorus Site Index."

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21. Maryland Cooperative Extension Nutrient Management Program In-service Training, Beltsville, MD, July 19, 2000. "New developments in nutrient management research."
22. Southern States Cooperative Inc., GrowMaster Training, Daytona Beach, FL, August 1, 2000. "P Indexes Establishment for Nutrient Management."
23. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, August 14, 2000. "The phosphorus cycle."
24. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, August 14, 2000. "Introduction to the Phosphorus Site Index."
25. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, September 13, 2000.
26. Maryland Department of Agriculture Nutrient Management Advisory Committee, Water Quality Improvement Act regulation drafting meeting, technical advisor. Annapolis, MD, September 28, 2000.
27. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, November 3, 2000. "Small grain cover crops."
28. Mid-Atlantic Crop Management School, Ocean City, MD, November 14, 2000. "Phosphorus Site Index: Part I."
29. Mid-Atlantic Crop Management School, Ocean City, MD, November 14, 2000. "Phosphorus Site Index: Part II."
30. Mid-Atlantic Crop Management School, Ocean City, MD, November 15, 2000. "Increasing corn production efficiency: Part I."
31. Mid-Atlantic Crop Management School, Ocean City, MD, November 15, 2000. "Increasing corn production efficiency: Part II."
32. U. S. Environmental Protection Agency, Comprehensive Nutrient Management Planning Steering Committee, Fairfax, VA, November 30, 2000. "Approaches to nutrient management training."
33. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, December 11, 2000. "Soil and manure sampling, nutrient analysis and assessment."

2001

1. Metropolitan Washington Council of Governments, Blue Plains Regional Committee, Biosolids Phosphorus Workshop, Washington, DC, January 17, 2001. "Delaware and Maryland research."
2. U. S. EPA, Comprehensive Nutrient Management Planning, Technical Advisory Committee Teleconference, February 21, 2001. "Effective nutrient management training."
3. Mid-Atlantic Soil Testing and Plant Analysis Workgroup, Richmond, VA, February 22, 2001. "Starter fertilizer."
4. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 7, 2001. AIntroduction to the Phosphorus Site Index concept in Maryland.@
5. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 7, 2001. AIntroduction to the Phosphorus Site Index calculation.@
6. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 7, 2001. AInterpretation of the Maryland Phosphorus Site Index final categories.@
7. U. S. EPA, Chesapeake Bay Program, Conference: Coordinating Phosphorus Based Nutrient Management Policies in the Chesapeake Bay Region, Frederick, MD, March 29, 2001. "Philosophy of P build-up limits on low vs. high testing soils."
8. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Planning, Laurel, MD, June 12, 2001. "Soil and Manure Sampling, Nutrient Testing, Analysis & Assessment".
9. U. S. EPA, Region 3, Technical Exchange, Philadelphia, PA, June 14, 2001. "Technical approach: the phosphorus site index."
10. International Training Program, University of Maryland. Agricultural Research Management, Research Extension Linkages, Monitoring and Evaluation and Management Information Systems Workshop, University of Maryland, College Park, MD. June 28, 2001. "Research-Extension linkages: the nutrient management example."
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD,

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- July 10, 2001. "Phosphorus cycle and phosphorus management."
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 10, 2001. "Soil acidity and pH."
 13. St. Mary's County Cooperative Extension, Nutrient Management Certification Training, Leonardtown, MD, July 16, 2001. "Sampling, testing, and analysis."
 14. Southern States Cooperative Inc., GrowMaster Training, Queenstown, MD, August 15, 2001. "Soil phosphorus management, the phosphorus site index, and Maryland's nutrient management regulations."
 15. University of Maryland Cooperative Extension Inservice Training, College Park, MD, September 10, 2001. "Nutrient management research update for regional specialists."
 16. University of Maryland Cooperative Extension Inservice Training, College Park, MD, September 12, 2001. "Using on-farm data for the P Site Index."
 17. U.S. EPA Chesapeake Bay Program, Nutrient Reduction Workgroup, Frederick, MD, September 13, 2001. "Coordinating P-based nutrient management policies in the Chesapeake Bay region."
 18. U.S. EPA, Comprehensive Nutrient Management Planning Training, Ocean City, MD, September 26, 2001. "Utilization of animal wastes."
 19. Mid-Atlantic Crop Management School, Ocean City, MD, November 14, 2001. "Phosphorus runoff from soil treated with sewage sludge and broiler litter."
 20. University of Maryland Cooperative Extension Inservice Training, Stevensville, MD, November 29, 2001. "Soil fertility management in organic production systems."
 21. Maryland Center for Agro-Ecology, Water Quality Improvement Act Science Summit, College Park, MD, December 10, 2001. "Re-examining the agricultural perspective on N & P."

2002

1. Maryland Cooperative Extension Home and Garden Information Center Winter School, Clarksville, MD, March 19, 2002. "Soils, soil testing, nutrient management, and recommendations."
2. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 3, 2002. "Introduction to the Phosphorus Site Index Concept."
3. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 3, 2002. "Phosphorus Site Index Calculations."
4. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 3, 2002. "Interpretation of the MD phosphorus site index final categories."
5. Maryland Department of Agriculture, Office of Resource Conservation, Nutrient Management Advisory Committee, Annapolis, MD, February 22, 2002.
6. USDA, Natural Resources Conservation Service, Beltsville, MD, March 12, 2002. "Nutrient management tools."
7. USDA/EPA Air Quality Task Force, Field Tour Host/Coordinator, Beltsville, MD and Queen Anne's County, MD, April 30, 2002. "Nutrient management in the Chesapeake Bay watershed."
8. Maryland Department of Agriculture, Office of Resource Conservation, Nutrient Management Advisory Committee, Annapolis, MD, May 14, 2002.
9. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Training, Annapolis, MD, June 18, 2002. "Soil and manure sampling, nutrient analysis and assessment."
10. John Deere Ag Marketing, Grasonville, MD, May 9, 2002. "Automation and data management assistance for nutrient management in the Chesapeake Bay region."
11. Willard Ag Services, Clarksville, MD, July 2, 2002. "Agronomic fertility recommendations and writing nutrient management plans."
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 17, 2002. "The phosphorus cycle and P management."
13. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, July 17, 2002. "Soil pH and liming."
14. Mid-Atlantic Soil Test Workgroup, Richmond, VA, February 20, 2002. "Maryland's phosphorus site index."
15. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD,

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- September 18, 2002. "Introduction to the Phosphorus Site Index Concept."
16. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 18, 2002. "Phosphorus Site Index Calculations."
 17. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, September 18, 2002. "Interpretation of the MD phosphorus site index final categories."
 18. Environmental Defense, Washington, DC, February 14, 2002. "Obstacles for implementation of the yield reserve program."
 19. Maryland Master Gardeners Advanced Training, College Park, MD, November 6, 2002. "Soil testing and nutrient cycling."
 20. Maryland Department of Agriculture, Nutrient Management Program, Fundamentals of Nutrient Management Training, Annapolis, MD, December 17, 2002. "Soil and manure sampling , nutrient analysis and assessment."
 21. Mid-Atlantic Crop Management School, Ocean City, MD, November 20, 2002. "Have you ever been P saturated?"
 22. Metropolitan Washington Council of Governments, Washington, DC, June 11, 2002. "Phosphorus runoff from biosolids applied to cropland."
 23. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Laurel, MD, October 16, 2002. "Phosphorus runoff from soils treated with sewage sludge and broiler litter."

2003

1. Maryland Cooperative Extension, AGNR in-service training, Annapolis, MD, January 14, 2003. "Agronomy updates."
2. Water Environment Federation joint residuals and biosolids management conference, Baltimore, MD, February 20, 2003. "Phosphorus fate and transport in biosolids amended soils."
3. Maryland Soybean Board, Easton, MD, February 26, 2003. "Agronomic and environmental evaluation of manure application to soybean."
4. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 19, 2003. "Phosphorus cycle and phosphorus management."
5. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 19, 2003. "soil pH and liming."
6. Metropolitan Washington Council of Governments, Phosphorus Availability Workshop, Frederick, MD, March 27, 2003. "P availability from land-applied biosolids."
7. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 2, 2003. "Introduction to the phosphorus site index concept in Maryland."
8. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 2, 2003. "Introduction to the MD phosphorus site index calculations."
9. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, April 2, 2003. "Interpretation of the MD phosphorus site index final categories."
10. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, June 17, 2003. "Soil and manure sampling , nutrient analysis and assessment."
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 1, 2003. "Introduction to the phosphorus site index concept in Maryland."
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 1, 2003. "Introduction to the MD phosphorus site index calculations."
13. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 1, 2003. "Interpretation of the MD phosphorus site index final categories."
14. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Laurel, MD, October 16, 2003. "Phosphorus in runoff from manured and sludged sites."
15. Eastern Shore Soil Nutrient Science Forum, Queenstown, MD, October 21, 2003. "Soil phosphorus status and management."
16. Mid-Atlantic Crop Management School, Ocean City, MD, November 19, 2003. "Management of biosolids

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application to cropland.”

17. Mid-Atlantic Crop Management School, Ocean City, MD, November 20, 2003. “Shortcuts to using the phosphorus site index.”
18. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, December 17, 2003. “Soil and manure sampling, nutrient analysis and assessment.”
19. Maryland Cooperative Extension, AGNR in-service training, Bowie, MD, December 11, 2003. “P update.”

2004

1. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, January 25, 2004. “Phosphorus cycle and management”.
2. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, January 25, 2004. “Soil pH and liming”.
3. Maryland Soybean Board, Easton, MD, February 19, 2004. “Agronomic and environmental evaluation of manure application to soybeans”.
4. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 25, 2004. “Introduction to the phosphorus site index concept in Maryland”.
5. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 25, 2004. “Maryland phosphorus site index calculations”.
6. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, March 25, 2004. “Maryland phosphorus site index final categories”.
7. Northeast Branch, American Society of Agronomy, Certified Crop Advisor Training Program, Bordentown, NJ, July 14, 2004. “The phosphorus index for agronomic and environmental nutrient management planning.”
8. SERA-IEG 17 Annual Meeting, New Bern, NC, July 20, 2004. “Development and incorporation of source availability factors into the P index.”
9. Mid-Atlantic Crop Management School, Ocean City, MD, November 17, 2004. “Size matters – How the size of things affects your fertility.”
10. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 14, 2004. “Introduction to the phosphorus site index concept in Maryland”.
11. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 14, 2004. “Maryland phosphorus site index calculations”.
12. Maryland Department of Agriculture, Nutrient Management Program Continuing Education, Annapolis, MD, October 14, 2004. “Maryland phosphorus site index final categories”.
13. Moscow State University Environmental Engineering Video Conference, College Park, MD and Moscow, Russia, October 15, 2004. “The Maryland phosphorus site index: an overview.”
14. USDA, CSREES, Mid-Atlantic Regional Extension Water Quality Workgroup N & P Team, Winchester, VA, June 7, 2004. “Phosphorus Availability Coefficients.”

2005

1. Water Quality Brown Bag Seminar, College Park, MD, February 14, 2005. “Issues and opportunities to improve the phosphorus site index.”
2. CSREES Mid-Atlantic Regional Water Quality Program, Phosphorus Forum, Frederick, MD, March 29, 2005. “Phosphorus source coefficients.”
3. Mid-Atlantic Crop Management School, Ocean City, MD, November 15, 2005. “P leaching in coastal plain soils.”
4. Mid-Atlantic Crop Management School, Ocean City, MD, November 15, 2005. “Cropping systems for remediation of P-enriched soils.”
5. Mid-Atlantic Crop Management School, Ocean City, MD, November 16, 2006. “Somerset drainage ditch project.”
6. AGNR In-Service Training Program, Bowie, MD, December 12, 2005. “Update on the Department of Natural Resource Sciences and Landscape Architecture.”

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2007

1. AGNR In-Service Training Program, Upper Marlboro, MD, September 27, 2007. "Writing winning grant proposals."
2. AGNR In-Service Training Program, College Park, MD, November 13, 2007. "Writing winning grant proposals."

4. SERVICE

a. Professional

i. Offices and committee memberships held in professional organizations

IMPACT: Providing a leadership role in many national and international professional organizations.

Offices Held

Secretary-Treasurer, American Society of Sugar Cane Technologists, 1988-1990.
 Executive Committee, Rice Technical Working Group, 1990-1992.
 Chairman, Northeast Coordinating Committee on Soil Testing (NEC-67), 1994-1995.
 Tour Coordinator, American Society of Agronomy, Northeastern Branch Meeting Committee, 1997.
 Secretary, Southern Regional Extension & Research Activity, Information Exchange Group (SERA, IEG-17),
 AMinimizing Phosphorus Runoff Losses for Protection of Water Resources@, 1996-1997.
 Chairman, Southern Regional Extension & Research Activity, Information Exchange Group (SERA, IEG-17),
 AMinimizing Phosphorus Runoff Losses for Protection of Water Resources@, 1997-1998.
 Organizer & Chair, Chesapeake Bay Region Nutrient Management Research Group (AMule Barn Group@), 1999-2000.
 Program Session Chair, OECD P Workshop 98: APractical and innovative measures for the control of agricultural phosphorus losses to water.@, Antrim, Northern Ireland, June 16-19, 1998.
 Program Session Chair, NRAES Conference, "Managing nutrients and pathogens from animal agriculture." Camp Hill, PA. March 28-30, 2000.
 Chairman, Northeast Coordinating Committee on Soil Testing (NEC-1007), 2002-2003.

Committee Memberships

Mid-Atlantic Soil Testing Workgroup, 1993-present.
 Northeast Coordinating Committee on Soil Testing (NEC-67 & NEC-1007), 1993-present.
 Southern Region Extension & Research Activity, Information Exchange Group (SERA, IEG-17), AMinimizing Phosphorus Runoff Losses of Water Resources@, 1994-present.
 Northeastern Branch, American Society of Agronomy, 1997 Annual Meeting Planning Committee.
 American Society of Agronomy, National Certified Crop Advisors Program, Soil Fertility Performance Objectives Review Committee, 1996-1997.
 Soil Science Society of America, Glossary of Soil Science Terms Committee (S374), 1999 - present.
 American Society of Agronomy, Harry J. Larsen/Hydro Memorial Scholarship Comm. (A442.1), 2001 – present.
 American Soc. of Agronomy & Soil Science Soc. of America, CAFO Regulation Review Comm., 2000 – 2001.
 Mid-Atlantic Regional Extension Water Quality Initiative, 2002 – present.

ii. Reviewing activities for agencies

USAID Proposal Review Board, MERC Program, 1994.
 USDA, ARS, NRI, BARC, Soil microbiologist search committee, 1996-1997.
 USDA, CSREES, National Research Initiative (NRI) Competitive Grants Program, Grant Proposal Reviewer, 1999.
 National Academy of Sciences, Research Proposal Review Board, 2003
 USAID Proposal Review Board, MERC Program, 2003

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USDA, CSREES, NRI Competitive Grants Program, proposal reviewer, 2004.
USAID Proposal Review Board, MBRC Program, 2004

iii. Other unpaid service to local, State, and federal agencies

U.S. EPA, Chesapeake Bay Program, Nonpoint Source Subcommittee, Agriculture Workgroup, 1993-1994.
Maryland Department of Agriculture, Nutrient Management Advisory Committee, 1993-present.
U.S. EPA, Chesapeake Bay Program, Nutrient Subcommittee, Nutrient Management Workgroup, 1993-1997.
USDA, ARS, NRI, BARC, Soil microbiologist search committee, 1996-1997.
USDA, NRCS, Nutrient Management Policy Planning Committee, 1997.
U.S. EPA, Comprehensive Nutrient Management Planning Technical Advisory Committee, 2000-present.
U.S. EPA, National Phosphorus Conference Planning Committee, 2001- present.
Renewable Natural Resources Foundation, Workshop Facilitator, 2002 Congress.
U.S. EPA CAFO Technical Advisory Committee, 2002-2004.

b. University

IMPACT: Doing my share to ensure the efficient operation of my Department and College.

i. Departmental

Chairmanship

Chair, Search Committee, Field Coordinator, Monocacy River Water Quality Demonstration Project, 1994.
Chair, Department of Agronomy, Library Committee and Library Liason, 1994-1996.
Chair, Search Committee, Field Crops Agronomist. 1998-1999.
Chair, Soil Testing Laboratory Review Committee, Maryland Cooperative Extension Service, 1995-1996.
Chair, Search Committee, Field Coordinator, Monocacy River Water Quality Demonstration Project, 1996.
EEO Officer, Department of Natural Resource Science & Landscape Architecture, 1998-2005.
Acting Department Chair, NRSL, May 10-15, September 1-6, September 16-20, November 4-8, 2002
Acting Department Chair, NRSL, January 20-24, March 24-28, 2003
Acting Department Chair, NRSL, March 4-April 16, 2004.
Chair, NRSL APT Committee, 2003-2004, 2004-2005.
Coordinator, Extension and Continuing Education, NRSL, 2005.

Membership

Search Committee, Sustainable Cropping Systems Specialist, Dep. of Agronomy, 1995.
Awards Committee, Department of Agronomy, 1994-1996.
Merit Pay Committee, Department of Agronomy, 1995-1996.
Extension Programs Committee, Department of Agronomy, 1994-1997
Faculty Review Committee, Department of Natural Resource Science & Landscape Architecture, 1998.
Graduate Admission Committee, Department of Natural Resource Science & Landscape Architecture, 1999-2003.
Merit Pay Committee, Dep. Natural Resource Sciences & Landscape Architecture, 2005-2006.
Faculty Advisory Committee, Dep. Natural Resource Sciences & Landscape Architecture, 2005-2006.

ii. College

Chairmanship

Director, University of Maryland Cooperative Extension Soil Testing Laboratory, 1993-2003.
Chair, Soil Testing Laboratory Review Committee, Maryland Cooperative Extension Service, 1995-1996.
Chair, Search Committee, Assistant Director, Agriculture and Natural Resources, Maryland Cooperative Extension Service, 1995-1996.
Chair, Review Committee, Assistant Director, Agriculture and Natural Resources, Maryland Cooperative Extension, 2007.

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Chair, Blue Ribbon Panel, Review of the Institute of Applied Agriculture, 2008.
Chair, Board of Directors, Northeast Regional Aquaculture Center, 2007-present.

Membership

Maryland Cooperative Extension Service, Environmental Issues Focus Group, 1994-1995.
Search and Screen Committee, Research Associate, Wye REC - Remington Farms Project. 1994
College of Agriculture, APT Emeritus Review Committee, 1994.
College of Agriculture & Natural Resources, RFMO Review Committee, 1996-1997.
Maryland Cooperative Extension Service, 1997 Annual Conference Planning Committee.
College of Agriculture & Natural Resources, Sewage Sludge Committee, 1998 -2006.
College of Agriculture and Natural Resources Spring Open House Lecture Series, April 19, 1999. Maryland agriculture and natural resources.
Maryland Cooperative Extension, 1999 Maryland State Fair Exhibit, Drought Information Booth.
Graduation Marshal, May 2003 Commencement.
Search Committee, Dean, College of Agriculture and Natural Resources, 2004-2005.
Search Committee, Assistant Director, Evaluation and Assessment, College of Agriculture and Natural Resources, 2007-2008.

c. Communal, State, National

Calverton Recreation Council, youth soccer coach, 1996-1998
Montgomery Soccer Inc., youth soccer coach, 1998-2000
Burtonsville Athletic Association, youth baseball coach, 1998-1999
Boy Scouts of America, Cub Scout Den Leader, 1999-2000

d. Service Awards and Honors

***IMPACT:** My efforts have been recognized by my peers and the public. I have received wide-spread accolades for exceptional contributions to the science of agriculture sustainability and natural resource protection on the national (U.S. Department of Agriculture), state (Governor's Citation), University (University of Maryland Alumni Association), and professional association levels.*

National

U. S. Department of Agriculture, Natural Resources Conservation Service, Recognition Award, AIn recognition of your contribution to and support of nutrient management...@ May 1999.
American Society of Agronomy, Northeast Branch, Agway Award, A...for outstanding contributions to agriculture.@, June 1999.
American Society of Agronomy, Northeast Branch, Extension/Industry Award, June 2001.
Epsilon Sigma Phi, National Honorary Extension Fraternity, Tau Chapter, March 2001.
U. S. Department of Agriculture, 2003 Secretary's Honor Award, USDA Group Honor Award for Excellence, June 2003.
U. S. Department of Agriculture. 2003 USDA ARS Award for Superior Technology Transfer Achievement, December 2003.

State / Regional

University of Maryland Alumni Association, Excellence in Extension Award, University of Maryland Alumni Association, College of Agriculture and Natural Resources Chapter, 1998.
State of Maryland, Governor=s Proclamation, Governor Parris N. Glendening, A...in recognition of his outstanding individual contribution to achieving the goals of a strong and viable agricultural community and a clean and healthy environment through nutrient management.@ March 2000.
Gamma Sigma Delta, Extension Award of Merit, 2002.

Frank J. Coale

ESCOP/ACOP Leadership Development Program, Class 14, 2004-2005.

University

The Fraternity of Alpha Zeta, Maryland Chapter, 1980.

Graduate School Fellowship Recipient, University of Kentucky, 1981-1982 and 1983-1984.

Gamma Sigma Delta Honor Society, 1985.

Sigma Xi Scientific Research Society, 1988.